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NOVEMBER 5, 1956

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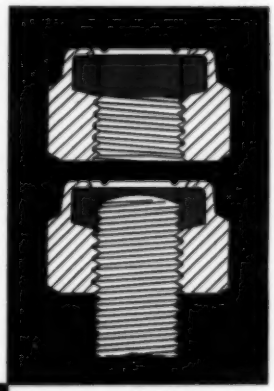

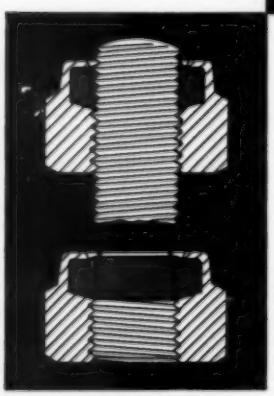

3 and exert a downward thrust bringing the lower flanks of the bolt thread into firm metal to metal contact with the matching nut threads, eliminating normal axial play.

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Official Airline Guide: Monthly publication of airline schedules, fares, World-Wide Edition: $19.50 per year, everywhere, North American Edition: $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St. Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert R. Parrish.
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Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $200 per year. Managing Editor—Mary Miller.
Airports: Weekly newsletter for airport officials suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.
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Contents

NOVEMBER 5, 1956

VOL. 20 NO. 12

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INDUSTRY ROUNDUP

FBI Probes Northeast Stock Activities .. 21
British Aviation Industry Lags 23
Jets Delay Piston Engine Ignition Progress 30
Simulators Key to Jet Pilot Training 32
NBAA Agrees Speed Control Needed in Terminal Areas 40

ELECTRONICS

CAA Ideas on How to Avoid Collisions 34
CAA Studies How to Safeguard Windshields on Jets 43

BUSINESS FLYING

Piper Unveil 1957 Models 50
Conference Urges Program to Cut Flying Hazards 52

TRANSPORT

Airlines Tackle Jet Ground Handling Problems 61
Subsidy Needs of Airlines Down 65
AF Jet Experience Should Help Airlines 68

DEPARTMENTS

When & Where 5
Personal View 7
Letters 8
Washington Report 10
Industry News Digest 11
Production Spotlight 16
Airtrends 18
New Products 44
West Coast Talk 48
International Aviation 56
Transport Trends 57
Airline Statistics 68
Airline Commentary 69
Employment 71
En Route 74

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When & Where

NOVEMBER

Nov. 5-9—Air Line Pilots Assn., biennial convention, Shoreland Hotel, Chicago.

Nov. 6-23—ICAO council on airport charges problems, Montreal, Canada.

Nov. 7-8—Air Transport Assn. Air Traffic Conference, Riviera Hotel, Las Vegas, Nev.

Nov. 7-9—Air Materiel Command Air Transportation Conference, Wright-Patterson AFB, Dayton, Ohio.

Nov. 8-9—SAE national fuels and lubricants meeting, Mayo Hotel, Tulsa, Okla.

Nov. 13—Fourth Massachusetts Aviation Conference, Hotel Statler, Boston.

Nov. 13-16—Air Transport Assn. purchasing committee, Saxony Hotel, Miami Beach.

Nov. 14-15—Aircraft Industries Association export conference, Miami Beach, Fla.

Nov. 14-16—General Electric symposium on jet engine overhaul problems, GE plant, Cincinnati.

Nov. 15—Conference on control and protection of airport approaches, University of California, Berkeley.

Nov. 15-16—New England Radio-Electronics Meeting, sponsored by Boston and Connecticut section of IRE, Hotel Bradford, Boston.

Nov. 22—Tenth general assembly FITAP (independent air transport federation), London.

Nov. 25-27—Aircraft Dealers & Mfrs. Assn., twenty-eighth meeting, Drake Hotel, Chicago.

Nov. 25-30—American Rocket Society annual meeting, Henry Hudson Hotel, New York City.

Nov. 26-27—Canadian Aeronautical Institute and Institute of the Aeronautical Sciences, joint meeting, Royal York Hotel, Toronto.

Nov. 26-29—Air Cargo Day and Engineering Program, American Society of Mechanical Engineers, Hotel Statler, New York.

Nov. 26—ASME Instrumentation Session, Hotel Statler, N. Y.

Nov. 27—ASME Propulsion Session, Hotel Statler, N. Y.

Nov. 28-30—First international meeting on ozone, Chicago.

DECEMBER

Dec. 3—Flight Safety Foundation's 1956 seminar in cooperation with MATS, West Palm Beach, Fla.

Dec. 4—Air Transport Assn. board of directors, Hotel Statler, Washington, D. C.

Dec. 5—Air Transport Assn. membership meeting, Hotel Statler, Washington, D. C.

Dec. 6-7—Third annual meeting American Astronautical Society, Inc., Hotel Edison, New York.

Dec. 17—Wright Memorial Dinner, Sheraton-Park Hotel, Washington, D. C.

JANUARY

Jan. 14-15—Third National Symposium on Reliability and Quality Control in Electronics, sponsored by IRE, AIEE, RETMA and ASQC, Hotel Statler, Washington, D. C.

Jan. 28-31—Eighth Annual Plant Maintenance Show, Public Auditorium, Cleveland.

FEBRUARY

Feb. 26-28—Western Joint Computer Conference, sponsored by IRE, AIEE and ACM, Hotel Statler, Los Angeles.

MARCH

Mar. 7-9—National Conference on Aviation Education, sponsored by National Aviation Education Council, Mayflower Hotel, Washington, D. C.

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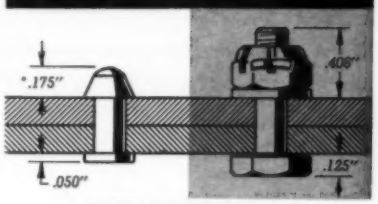

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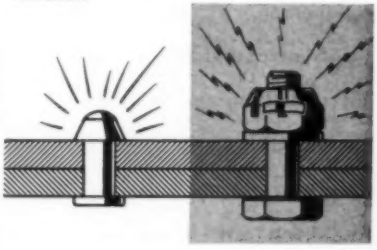

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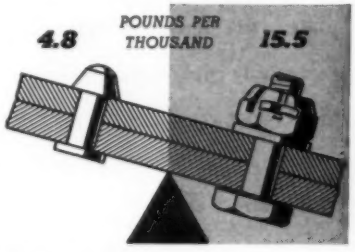

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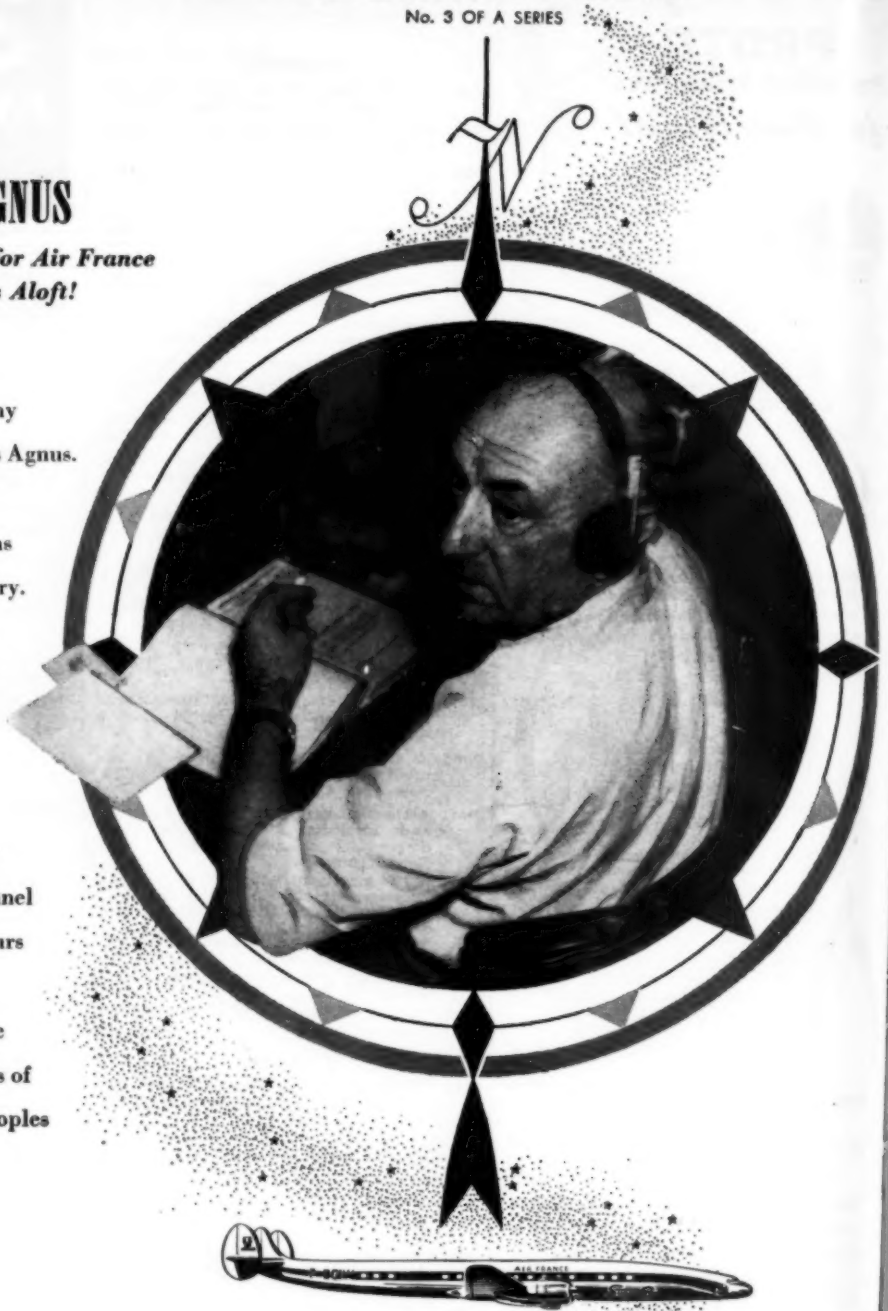

Aviation has come a long way since 1921—and so has Louis Agnus. As a flight engineer he has pioneered with such giants as Bossoutrot and Saint-Exupery. He was flying regular night service as long ago as 1926. His navigational skill has been tested by survey flights throughout the world—Louis Agnus is today among the elite flight personnel of the world, with 21,000 hours aloft to his credit. He has materially contributed to the Air France record of 37 years of dependable service to the peoples of 73 countries.

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Personal View

By WAYNE W. PARRISH

Here's A Diabolical Regulation

AS IF it didn't already have enough to do, the Civil Aeronautics Board is considering the adoption of a new regulation calling for realistic scheduling and on-time performance for the airlines.

The regulation would require the airlines to arrive on time at each stop 75 per cent of the time or face criminal penalties. If delays were caused by matters over which the airline had no control, then the airlines could defend themselves.

It all sounds simple. It sounds constructive in the public interest. There are even times when it might even seem to be reasonable if you were under the influence of narcotics.

But the regulation is, in fact, one of the most diabolical, useless, senseless, indefensible and extraordinary regulations ever dreamed up by an uninformed bureaucrat for the furtherance of bureaucracy in all the history of regulatory hash.

There is a question whether it is enforceable at all, either legally or from a practical standpoint, but if it were made to stick it would multiply airline costs by many millions of dollars a year; it would lead to extending flight time interminably, and it would result in a deterioration of airline service to the public.

One of the most extraordinary features of the whole extraordinary business is the role being played by Joseph P. Adams, the Democratic member of the CAB whose term expires December 31 of this year. It is difficult to believe that even Mr. Adams doesn't understand the evil implications and consequences of the regulation, but his questioning at the day-long oral argument before the Board on September 26 makes one wonder if he has learned anything at all about the airline business during his term of office. If it is ignorance, it is merely sad and pathetic. If he merely pretends not to understand, then it is tragic.

Apparently the regulation (which is being fostered in the public interest) had its origin in complaints to the Board about certain instances of unrealistic scheduling. Okay. There *have* been instances of airlines advertising *flight* times which were unrealistic. We believe these abuses should be corrected and we believe the Board has ample power to make the corrections.

But such abuses are not common. Even Clarence Sayen, president of the Air Line Pilots Association, who appeared at the oral argument to favor the regulation (but armed with little evidence), testified that the illustrations he used are not normal. "By and large normal schedule practice will indicate a large percentage of on-time performance," he said, although in his rebuttal he strangely contradicted himself.

These isolated abuses pertain to *flight* times, block to block times. But the regulation which was promulgated is quite a different kettle of fish. As Hubert Schneider, Braniff's attorney, said, "The regulation is not couched in terms of 'Does your flying time accommodate yourself to realistic scheduling 75 per cent of the time?' It does not say flying time. It says 'You must arrive at Chicago 75 per cent of the time on schedule'."

On multiple-stop schedules, the potential violations for one particular flight per month become astronomical because the regulation makes no allowance for the adherence to flying times between any two segments; it's all cumulative. Scheduling is an involved matter to start with and the vast bulk of *flying* times today are as realistic as anything could be.

But there are 40 different categories of causes of delay on the ground, and a great many in the air of which weather and air traffic control are only too well known. If the regulation is adopted, and the airlines decided that they would have to protect themselves from criminal penalties, the consequences would be complex, destructive, and extremely costly.

There has never been such a regulation for railroads or buses. *Reliability cannot be created by a regulation.* There are a great many factors which motivate all airlines toward realistic scheduling. Schedule changes and evaluation are under constant study. The few unrealistic examples, resulting almost solely from competitive reasons due to certain equipment performances, are not really too serious although they should be remedied in the interest of the traveling public.

But the regulation as a whole would be ridiculous if it weren't so serious. There is no sense in penalizing the entire industry because of a few examples of competitive desires to advertise a few long-haul schedules along with the fastest. The saddest feature of the whole exhibition is that the ignorance within the Board is so dense that a regulation of this type could have gotten so far as to require an oral argument. How much better if the Board and its staff could have spent the equivalent amount of time in a few flight control rooms of airlines. But then that might expose them too much to an industry which they are trying to regulate with such heavy hands.

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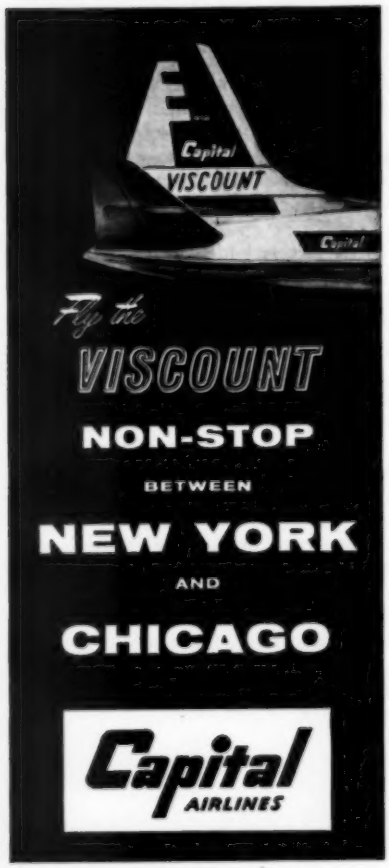

Letters

Items They Liked

To the Editor:

I wish to express my admiration of your recent article on the storage and retrieval of information in the August 27th issue of AMERICAN AVIATION.

This subject has long been a costly and industry-ignored one. Your treatment of the various means of storing and retrieving information helped to point out to research and development the actual benefits that might be derived from an intelligent approach to the information problem.

Once again, may we express our admiration for the manner in which you presented the part that Information for Industry, Inc. plays in the storage and retrieval of information.

LYNN J. BARTLETT, JR.,
President, Information for Industry, Inc.
Washington, D. C.

To the Editor:

Your article in the September 24th issue "General Aviation Faces a Challenge" has only just been read. I missed the issue, due to some traveling, and it just came back across my desk.

You have done a fine, constructive job in the reporting of some of general aviation's current activities and problems. Many thanks.

JOSEPH T. GEUTING, JR.,
Manager, Utility Airplane Council.
Aircraft Industries Assn.
Washington, D. C.

Correction

To the Editor:

I note in your fine October 22 issue a page titled "U.S. Missile Arsenal." Therein we are linked with Martin as manufacturer of the Sidewinder air-to-air missile. As far as we know, Martin does not have and never has had, any connection with the Sidewinder.

WILLIAM WIGHT
Director of Public Relations
Philco Corp.
Philadelphia, Pa.

Editor's Note: Reader Wight is correct. We muffed that one. The Sidewinder is being built by Philco and General Electric Co., Utica, N. Y. (see page 158 of same issue).

Books

Wing Leader. *By "Johnnie" Johnson. Published by Chatto & Windus, 40/42, William IV St., London W. C. 2., England. Price $2.10 plus postage.*

Outspoken autobiography of Group Captain J. E. Johnson, currently an RAF staff officer, from World War II cadet to fighter wing leader in the advance into Germany. Johnson also served in USAF Sabers over Korea. His comments on RAF co-operation with the Eighth Air Force bombing missions, the fall in quality of **Luftwaffe** personnel despite the excellence of its airplanes—including the first jet and rocket fighters—are vivid.

A book for all who love flying, but not just another flying book, this is a serious historical operational record as well—with lessons for today. A. V.

Test Flight. *By Wing Commander "Sandy" Powell. Publishers, Allan Wingate Ltd. 12, Beauchamp Place, London, S. W. 3., England. Price $2.10 plus postage.*

A curious miscellany of chapters from the experiences of a veteran service and civilian test pilot, this contains much of interest, is pleasantly written, yet lacks a co-ordinating thread. Brief histories of Britain's airplane builders are useful for reference.

Aircraft Materials and Processes. *By George F. Titterton, 5th edition. Published by Pitman Publishing Corp., 2 West 45th St., New York. 398 pp., illustrated.*

An up-to-date treatment of latest processes, materials and specifications used in the aircraft industry, authored by the Asst. Chief Engineer of Grumman Aircraft Engineering Corp. Includes emphasis on new materials such as titanium, plastics, superstrength steels.

J. S. M.

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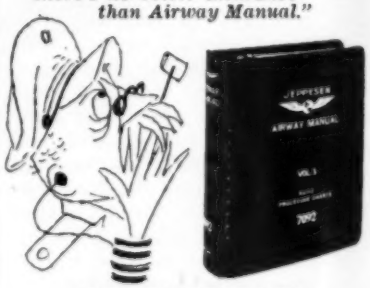

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Already behind it are more than two years of flight testing – including tests by 100 airline pilots. Many of these are the men who, flying the great Boeing jets, will whisk you from coast to coast in under four hours and a half, and from New York to London in five hours and a half. They are an aircraft's key men, and Boeing wanted them to put the 707 through its paces.

At the start of each flight, Boeing's test pilot waved one of the airline pilots into the captain's seat and said: "Take it away. She's all yours." They put the craft through flight maneuvers that tested its every characteristic, even under such extreme conditions as flight with two engines on the same side shut off.

The airline pilots' reports were uniformly enthusiastic. Here's a typical one: "Almost incredibly simple to manipulate and easy to fly. Yet it is as powerful as it is docile." Another: "The flight was easily the most exhilarating of my flying career, and I'll include my first solo."

The 707 impressed the airline pilots with its easy handling, its amazing performance, its quiet, vibration-free ride – and the simplicity of its controls – 115 fewer than in conventional airliners. One summed up his reactions like this: "The 707 generated in me a feeling of complete confidence and reliability. Its performance is superb. For the airline pilot, the 707 marks a new, brighter era – something he has dreamed about." And another: "Airline pilots are going to love these swept-wing, high-performance jets."

You will, too, when you ride a great Boeing Jet Stratoliner!

BOEING

Washington Report

AF to Boost Budget Request

Look for Air Force to ask for about $2 billion more obligational authority in its fiscal 1958 budget request than this year's total. Most of it will be for aircraft and related procurement.

Actually, AF was able to ask for $1 billion less than it needed this year. But with contract lead-times now cut to a minimum (down from 30 to 16 months in four years) and with the reservoir of Korean leftover money now exhausted, the service will have to cover all its 1958 new contracting needs with new money, less whatever remains of the $800-million special appropriation for this year.

Another factor that will run AF procurement up is need to superimpose a major strategic missile program without cutting back manned aircraft buying. Problem with missiles is that until they undergo "operational" testing, there's no way of estimating their combat lead-time, or, in fact, their relative ability to replace manned aircraft.

Fact that all three services face a similar budgeting problem means there probably will be some pretty rough in-fighting between Army, Navy and Air Force in their efforts to fit all their requirements under Defense Secretary Wilson's overall military budget ceiling.

Meanwhile, USAF expenditures (as against contracting) will jump sharply as aircraft deliveries climb from 1,900 this year to between 2,600 and 3,000 in fiscal '58 and as missile procurement leaves the progress payment stage and goes into actual developmental and testing production rates.

AF Bid to Business Flyers

Air Force would like to conduct a jet know-how symposium for business aircraft operators, similar to those held recently with airlines. Offer has been extended by Lt. Gen. Thomas Power, CO of Air Research and Development Command, to National Business Aircraft Assn.

Idea apparently stems from USAF desire to buy "off-the-shelf" jet equipment for its own executive transportation which would be enchanced by increased demand for jets by business flyers.

Why Sam Saint Left ATA

There's more to the recent resignation of S. P. (Sam) Saint from Air Transport Assn. than the routine announcement of his departure indicated.

Not explained was the sharp disagreement between Saint and ATA in general, and vp-operations and engineering Milton W. Arnold in particular, over the association's policy in air traffic control matters.

Core of this conflict was the brush-off ATA gave Saint's proposal for stage-by-stage introduction of automatic ATC facilities. Another contributing factor was his opposition to ATA's policy of de-emphasizing airline participation in long-range planning for traffic control.

Saint, who since has returned to active flight status with American Airlines, contends ATA's present ANTC staff is hopelessly snowed under with day-to-day problems and that his assignment as a "one-man team" to keep abreast of long-range developments was a short-sighted policy in protecting the airlines' billion-dollar investment in jets.

Saint joined ATA on leave from American in 1949. In the past seven years he has emerged as the airlines' No. 1 authority on air traffic control. He is convinced ATA policy falls far short of protecting its member airlines' interests in ATC matters and has gone back to flying duty rather than support it.

Big question now for carriers to decide: Who's right, ATA or Sam Saint?

How Much Airlift?

JCS Chairman Adm. Arthur Radford has thrown cold water on "complete reliance" by armed forces on airlift as sole answer to their transportation requirements.

The nation, he says, would be wise "to avoid the pitfall of regarding air transportation *per se* as the answer to all our problems."

His remarks apparently were directed at Army which is making ambitious plans for air transportable divisions capable of massive vertical envelopment.

"To begin with," Radford says, "air transportation is not cheap, nor is it always the most efficient and effective means of transporting units, especially large ones over long distances." Air mobility, he points out, requires a base network complete with terminals, refueling and repair facilities. Its operation is vitally affected by availability of petroleum products and supporting personnel.

"When all these factors are considered, it may well be determined that the bulk of the forces and equipment to be moved . . . could be moved more expeditiously . . . by improved surface transportation."

This view was endorsed by another top Navy official, Vice Adm. William V. Davis, deputy chief of naval operations for air. Said he: It would cost 40 times as much to transport a division by air as by sea, and there would be "no increase in speed."

Air Force and Army, which emphasize need for speed and mobility as opposed to economy, are not likely to go along with Navy view.

Army Scores Nuclear Victory

Army scored a major public relations *coup* when it persuaded Dr. Edward Teller, father of the H-bomb, to appear at the U.S. Army Assn.'s annual convention The nuclear physicist flatly declared that small independent Army units armed with precision nuclear weapons "will turn out to be the key to real military power."

This is what army wanted to hear, since it has been preaching that doctrine for several years. But in getting a man of Dr. Teller's stature and unique background to come out so decisively in favor of its position represents an important victory in its long campaign.

Dr. Teller rejects the use of the H-bomb as an instrument of war and, by implication, the philosophy of massive thermonuclear retaliation around which USAF Strategic Air Command is built:

"Many have jumped to the conclusion that nuclear bombs as such are weapons of terror and cannot be used except to create wholesale destruction . . . I am convinced that nuclear bombs can be used for defense in the strictest sense of the word. They can be used in a way that will do minimal damage to the civilian population and which will be concentrated on the armed forces of an opponent."

Industry News Digest

Army Design Planning Envisions 7 New Aircraft, Including 3 VTOLs

Maj. Gen. Hamilton Howze, Director of Army Aviation, has announced that the Army is working out design objectives for seven brand new aircraft, including at least three vertical-lift machines mentioned by the Army for the first time.

Howze's disclosures came at the second annual meeting of the U.S. Army Association in Washington, D. C. Among other Army speakers were such figures as Lt. Gen. James Gavin, Director of Research, Maj. Gen. John B. Medaris, commander of the Army Ballistic Missile Agency at Redstone Arsenal, Huntsville, Ala., and Dr. Wernher von Braun, chief of development operations for ABMA and a key scientist in the development of the German V-II missile.

The three completely new aircraft mentioned by Howze are:

• **A light, simple** observation helicopter, costing about one-third of present models, which would be procured on a "really large scale" for combat forces. The machine will be placed in design competition and should be ready for field use by 1959 or 1960. Several commercial helicopters now under development "might enable the Army to meet this requirement earlier."

• **A new medium cargo** helicopter powered with turbo-shaft engines and having a payload capacity of three tons. Proposals are now under consideration, and the new rotary-wing aircraft should be available for troops about 1960 or 1961.

• An **aerial jeep** incorporating two of the ducted fan rotor systems used in the Hiller Flying Platform. Vehicle should weigh about 1,000 pounds and have a payload of 500 to 1,000 pounds. Stores would include radio equipment, machine gun or possibly a 106 mm recoilless rifle. A design competition will be ordered before the end of the year, and troop tests should begin by 1959. "The future possibilities of this application are so great that I will leave them to your imagination."

Howze also discussed progress in the design of four other aircraft, all of which have been mentioned previously. They are a flying crane, a high performance observation aircraft with short take-off and landing (STOL) capability, and a light and a medium fixed-wing cargo transport, both with STOL abilities.

• **"The flying crane** concept is in the hands of industry for study at the present time. We should conduct a design competition for cranes next year and hope to be able to develop one for use by the Army during the period 1962 to 1963," Howze said. The crane should have a speed of 50 knots and a payload of 8 to 15 tons.

• **The observation plane** is presently the subject of a design competition, and the final product should be available by 1960 for issue to the troops. The aircraft should be able to take off over a 50-foot obstacle in 600 feet while possessing a speed capability of 275 to 300 knots.

• **The two STOL** transports are considered for development by 1960-61 or earlier. One would have a 2½-ton payload, a speed of 200 knots and could get over a 50-foot obstacle in 500 feet, while the other would have a four-ton capacity, a speed of about 250 knots and identical STOL capabilities.

The possibility of combining the two cargo aircraft into a single machine with vertical take-off and landing (VTOL) capability has also occurred to the Army, Gen. Howze said. Its payload in the VTOL configuration could be about two tons, and it could lift four tons where a short take-off run could be performed.

"In the short 4-ton usage of this plane, it should have a speed of about 200 knots, a troop capacity of 40 men, and a take-off and landing capability within 500 feet. In its vertical take-off configuration, the plane would have a lesser load of about 2 tons and a speed of about 250 knots. Test models of these aircraft could be available in the 1961 or 1962 period."

Gen Howze also said the Bell XH-40 helicopter, powered by the Avco Lycoming T53 turbo-shaft engine, "should fly within the next couple of months." With a cruise speed of 100 knots and a payload capacity of 1,000 pounds, it will be available for issue to field forces in 1959, he said.

• **The Jupiter** mid-range ballistic missile "is definitely and certainly on time, each milestone fixed a year ago is being met, and some guide posts are being surpassed," Maj. Gen. Medaris assured the Army Association.

Bell XV-3 Crashes

Bell Aircraft's XV-3 convertiplane crashed near Ft. Worth on Oct. 25 during an emergency landing and was badly damaged. The pilot, Dick Stansbury, was injured.

The XV-3 program, however, will continue with the second prototype, which is about ready for flight. Army financed the tilt-rotor Bell convertiplane under its program to develop vertical takeoff and landing (VTOL) aircraft.

Larry Bell Dead

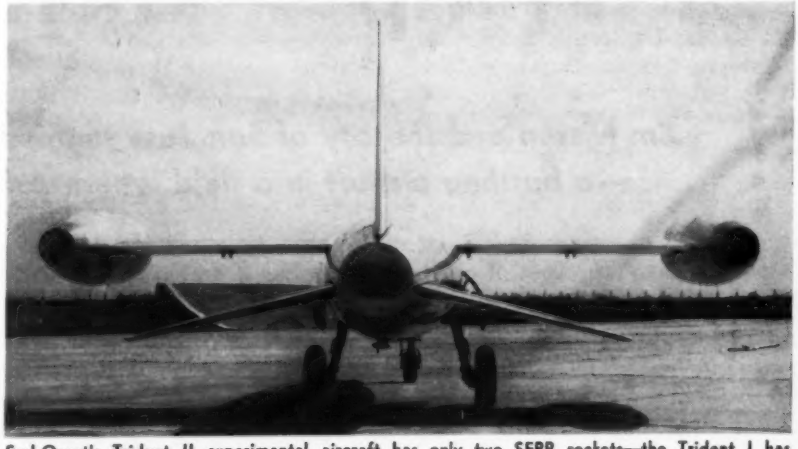
Lawrence Dale Bell, 62, board chairman and founder of Bell Aircraft Corp., died in Buffalo, N. Y., Oct. 20 following a heart attack.

His death ended a remarkable 45-year career in aviation which won him many honors, including the Collier Trophy. He was recipient last year of the Exceptional Service Award, USAF's top civilian honor.

Bell started as an airplane mechanic

(*Continued on Page* 14)

Rocket-Powered Trident II



Sud-Ouest's Trident II experimental aircraft has only two SEPR rockets—the Trident I has three. The second model of the French plane has attachments for an air-to-air missile under its fuselage.

Starting in a Cabbage Patch . . .

Jim hit pay dirt!

Jim Nissen and the city of San Jose teamed with Shell. The result —a bustling airport in a field where cabbages once grew.

TODAY, the fleet of Shell trucks at San Jose Municipal Airport is pumping ten times more fuel than seven short years ago. And with manager Jim Nissen's plans for a 1200-acre field in the near future, the gallonage will keep right on going up.

It all started in 1946 when Jim built a small airport on a 16-acre cabbage patch . . . one hangar and an office. But it didn't take him long to outgrow these 16 acres.

One year later, he added an additional 64 acres to handle the booming air traffic. But

before long even that wasn't enough to take care of all the business flying his way.

When the city of San Jose took over the field for a municipal airport in 1948, Jim stayed on as top man and Shell was chosen to "join the team."

In Jim's own words, "Service is what sells in this business. For example, we handle about 10,000 flights a month—including 14 flights a day by Southwest Airways. With traffic like this, we've got to get every plane off *on schedule*. And we do—thanks to our modern equipment, which Shell has designed to help save time in every service operation.

"And with traffic getting heavier every month, we spend a lot of time working out the new problems with Shell aviation specialists. We also make good use of the service tips in the Shell dealer magazine.

"And it's paid off! Corporations like Ford, Rexall, Reynolds Metal, Sears Roebuck, Monsanto Chemical and Fleischmann's Yeast use our airport. What's more, Shell is helping us get more *new* business every month."

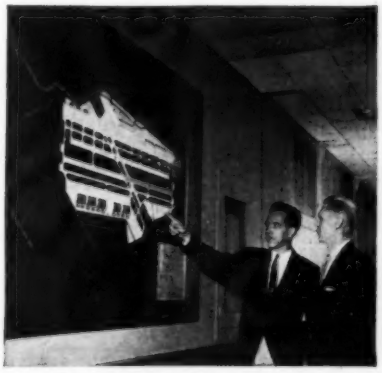
All in all, Jim Nissen has guided the spending of over $2,000,000 developing that one-time cabbage patch. The results are impressive: in 1948, 20 private planes were based at the airport. Today 100 planes are based there, including 46 corporate aircraft. And there's a long waiting list for hangar space.

The airport's facilities include a restaurant that attracts non-flying residents of San Jose as well as fliers . . . taxi and car rental services . . . and a large, modern maintenance shop.

Yes, wonders have been worked in that cabbage patch—thanks to the team of Jim Nissen, the city of San Jose and Shell.

Ted Simon, who operates a crop-dusting service from the field, likes the way Shell service keeps his planes on the job.

Jim talks over newer, better service methods with Bob Wright, co-owner of the field's maintenance shop.



Jim watches the field's expansion closely. Here he checks plans for the new 1200-acre field with his assistant, Jack Harper.

It pays to be a Shell Aviation Dealer

—and the Shell office nearest you will be glad to show you why

SHELL

(*Continued from Page* 11)

Industry News Digest

for Grover E. Bell and Lincoln Beachy in 1912. He later served as vice president and general manager of both The Glenn L. Martin Co. and Consolidated Aircraft Corp., before forming Bell Aircraft Corp. in 1935.

He retired this summer as president of the company and was elected board chairman.

At the time of his resignation he was reported as substantially recovered from a circulatory attack and was working on a part-time basis.

British Approve BOAC Purchase of 707s

The British government has given BOAC permission to buy 15 Boeing 707-420 jet transports powered by Rolls-Royce Conway engines. The cost of the aircraft and initial spares is about $123 million of which $98 million is in dollars and $25 million in sterling.

The first 707-420 will be delivered to BOAC at the end of 1959 and the aircraft will be introduced on routes to North America starting in 1960. The Boeings may also be used on a new BOAC route to Australia via the U.S. and the Pacific.

BOAC's 707s will be 153 ft. long, longer than the 146 ft. 3 in. of the Boeing 707-320, the J75-powered intercontinental version of the jet transport. Boeing also has two versions of 120 series of the 707—a short-body 120 and a long-body model. Qantas Empire Airways has ordered the short 120, the 138.

Hughes Tool Advances $26 Million to Convair

A $26,266,500 advance payment has been made by Hughes Tool Co. to Convair as the two companies concluded definitive contracts for 30 Model 880 jet transports for TWA.

Total value of the TWA order has been estimated at $150 million, including spares. The TWA and Delta orders amount to $200 million, or about $5 million per plane, with spares.

UAL Orders Collins Warning Indicators

An order for 250 airborne proximity warning indicators from Collins Radio Corp. has been authorized by the board of directors of United Air Lines. Price will be about $1,750,000.

The collision warning units will be installed on UAL's entire fleet of two and four-engined aircraft. Deliveries will begin in September, 1958.

AF Orders New Design Proposals for Chemical Bombers, A-Plane Stretch-Out

The Air Force has turned down Phase I design study proposals by Boeing and North American for the WS-110A chemical bomber and has ordered the companies to come up with new studies. At the same time, it has decided to stretch out Convair's WS-125A nuclear bomber project.

A principal reason for the actions was said to be a shortage of money available for research and development projects. The USAF is presently developing eight separate thermonuclear delivery vehicles and it is impossible for the airmen to keep them all going at the same tempo within their present budget.

• **The decision** to order a new design effort on the WS-110A reportedly came early in October. The Air Force was not satisfied with the hardware proposed by the two contractors to meet its stringent requirements for the supersonic, extremely high altitude, long-range bomber. It ordered Boeing and North American to make renewed studies of the problem in hopes that they can find more efficient ways of meeting the General Operational Requirement for the aircraft.

The WS-110A is called a "chemical" bomber because it is designed to use the so-called "exotic" or "zip" fuels. These are hydrocarbons like jet fuel plus powdered metallic additives such as aluminum, boron or lithium for extra energy. The additives are mixed with the fuel in a slurry for easy handling in the engine. The WS-110A is expected to be available about 1962 as a replacement for the Boeing eight-jet B-52 intercontinental bomber.

The decision to de-emphasize Convair's effort to develop a nuclear bomber was made in connection with the allocation of Fiscal 1957 development funds, it was learned. Difficulties with the General Electric powerplant for the aircraft were cited as one reason for the action, but it is believed that the pinch in R&D funds was the primary reason for the step.

• **Under the new arrangement,** Convair and GE will continue their work on the atomic aircraft, but with less urgency than has been the case up to now. The flying prototype will be available some three years later than originally planned.

Lockheed is also working on a nuclear bomber for the WS-125A program, but this project is apparently going ahead on schedule. Pratt & Whitney is supplying the engines for the Lockheed airframe.

The chemical and nuclear bombers are just two of eight thermonuclear delivery systems under development in the USAF. The others are the Northrop Snark and North American Navaho air-breathing intercontinental missiles, the Convair B-58 Hustler supersonic bomber, the Martin Titan and Convair Atlas intercontinental ballistic missiles and the Douglas Thor mid-range ballistic missile.

Gen. Doolittle Named Chairman of NACA

Lt. Gen. James H. Doolittle, USAF (retired), has been named chairman of the National Advisory Committee for Aeronautics, succeeding Dr. Jerome C. Hunsaker, who has held the position for the past 15 years. Dr. Hunsaker will continue as a member of the committee.

Doolittle has served with NACA since 1948. Dr. Hunsaker was a member in 1922-23 and was reappointed in 1938, serving continuously since then.

Pre-Production Super Mystere

This is the first pre-production Dassault Super Mystere B2. Powerplant is a 10,000-lb.-thrust SNECMA Atar. Production aircraft will come off the French company's lines early in 1957.

Convair B-58 Taxis, Near First Flight

The B-58 Hustler early this week started its taxiing tests at General Dynamics Corp. Convair division's Fort Worth plant. The company announced that the wasp-waisted, delta-wing supersonic bomber would make its first flight within 10 days.

The B-58 is powered by four General Electric J79 engines, each delivering 11,000 lbs. static dry sea-level thrust without afterburning and 16,000 lbs. with. It appears to have auxiliary rocket boost units on the two inboard engines, and is reported to be capable of straight and level flight speeds of Mach 1.7-to-1.8 at altitudes well in excess of 50,000 feet.

Tagged a "medium bomber" in the B-47 class, the Hustler has a range with one aerial refueling about equal to that of the B-52 without refueling. Because of this relatively short unrefueled range, Strategic Air Command chief Gen. Curtis E. LeMay isn't too sure he wants the plane for SAC. However, the makers figure they've got other markets for it than SAC. They're plugging it simultaneously as a strategic bomber, tactical bomber, photo-reconnaissance plane and interceptor.

What kind of mission it performs can be changed merely by changing its externally podded payload, which may be nuclear bombs, air-to-air missiles, photographic equipment, etc. The Hustler apparently has no internal bomb-bay and fuel is carried in the fuselage as well as in the wings. The official release says the B-58 has 16 complete subsystems, all of which are "virtually automatic." Its three single tandem cockpits carry pilot, navigator and defensive systems operator.

Bernt Balchen Retires After 30 Years' Service

The Air Force last month announced the retirement of one of the world's foremost polar explorers, Col. Bernt Balchen. His retirement became effective Oct. 31.

The explorer, who was the first pilot to fly over the South Pole, was forced to leave active duty with the Air Force because he has had more than 30 years of military service, including more than five years as a colonel. His retirement could have been avoided, either through a promotion to brigadier general or through a special action by Air Force Secretary Donald Quarles. The Air Force chose neither alternative, so Balchen's retirement was mandatory.

Balchen's last assignment was Special Assistant for Arctic Affairs to Lt. Gen. Glenn O. Barcus, Commander of the Northeast Air Command. He was scheduled to receive the Distinguished Service Medal at Pepperell AFB, Newfoundland, prior to his departure.

News Briefs

MANUFACTURING-MILITARY

• **Bell Aircraft's** helicopter division delivered the 100th commercial helicopter it has sold this year, boosting its commercial business 30% above that of the first three quarters of 1955.

• **A $60,976,468** letter of intent to purchase 271 T2V Seastar carrier-based jet trainers has been received by Lockheed Aircraft Corp. from the Navy. This followed an earlier $25-million contract.

• **Rheem Mfg. Co.** received a $2,667,000 continuation contract from Convair for F-102A control surface parts.

• **Army is converting** eight Vertol H-21 helicopters for use as VIP transports to and from the Washington Military District. Work will be completed by mid-December. Conversion cost will be $11,529.56 per helicopter, including installation of fiberglas insulation, carpeting, foam cushions, airliner seats, etc. Each helicopter will carry nine passengers and crew of three.

• **Aeronautical Div.** of Minneapolis-Honeywell Regulator Co. was awarded a $6,883,000 contract to supply low altitude bombing systems to the Navy. This is the fifth major contract received by M-H for the systems.

• **The Glenn L. Martin Co.** reported $2,868,790 net income on $89,805,834 sales in the third quarter of 1956, against $2,855,507 net on $87,827,737 sales in same 1955 period. Profit for first nine months was down, totaling $7,311,022 on $228,766,424 sales, against $9,193,909 on $194,805,592 last year.

• **Cessna Aircraft Co.'s** sales in the 1956 fiscal year, ended Sept. 30, topped $66 million, a 32% gain over 1955 business of $50 million. Earnings are estimated to exceed $5.50 per share against $3.38 last year.

• **McDonnell Aircraft Corp.** was awarded a $58,124,717 Navy contract for additional production of F3H-2N Demon all-weather fighters. This followed an earlier $55-million order for the planes. Company reported $1,738,978 profit on $57,299,735 sales for the first quarter of its fiscal year, ended Sept. 30, compared with $1,234,574 net on $41,454,685 sales in same 1955 period. Demon order increased backlog to $711,918,860.

• **General Electric** received a $17-million Navy contract and Philco Corp. a $14-million award for production of guidance and control units for Sidewinder air-to-air missiles.

• **Thompson Products Inc.'s** earnings for first nine months totaled $7,565,219 on $214,722,134 sales, against $8,986,542 profit on $214,478,664 sales in same 1955 period. Third-quarter earnings were $2,703,377 and $2,218,393, respectively. Company anticipates a "strong fourth quarter."

TRANSPORT

• **Flying Tiger Line** asked CAB to increase minimum airfreight rates by 3% on Nov. 15. It accused American Airlines of a "continued and persistent effort to keep airfreight rates from covering the cost of rendering airfreight service."

• **Slick Airways** on Nov. 1 moved its general executive offices from Burbank, Calif., to Dallas, Tex. About 120 personnel will make the move. Purpose is to bring all points of the airline's route system "much closer together timewise, both in terms of communications and in executive travel."

• **American Airlines'** net earnings for first nine months of 1956 totaled $15,761,000, exclusive of profit on aircraft sales. Latter profit totaled $1,317,000, bringing aggregate earnings to $17,078,000. Net for same 1955 period was $14,337,000. Revenues this year were up 11% from $194,895,000 to $217,281,000. Company carried 5,856,721 passengers a total of 3,697,054,000 passenger-miles, up 13.1%.

• **United Air Lines'** record earnings for the first nine months of 1956 totaled $11,385,844 after taxes and aircraft sales profits, compared with $10,011,309 last year. Net gain on sale of aircraft was $535,617 for the third quarter and $1,272,888 for the nine months, after taxes. Third-quarter net earnings were $6,124,960, compared with $5,739,229 last year.

• **Delta Air Lines'** September earnings were $158,000, up 13.96% from same 1955 month. Gross revenue rose 19.98% to $5,786,000.

• **Harry (Bud) Baer Jr.** has been elected secretary-treasurer of the Aeronautical Training Society, succeeding Wayne M. Weishaar, who died recently.

• **U.S. and Colombia,** after years of negotiation, signed an air transport agreement. The pact, which becomes effective next January if ratified by the Colombian government, will permit Braniff Airways to start service to Bogota. Avianca, a Pan American affiliate, is now the only carrier connecting the Colombian capital with the U.S.

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Production Spotlight

• Air Force has flown multi-engined aircraft from Wright-Patterson AFB to England without a crew aboard. "Following the beam," aircraft had electronics as only payload and ground stations knew of each electronics malfunctioning as it occurred and were able to pinpoint such items as tube failure.

• Tinker AFB, Okla., will phase in Boeing KC-135 jet tankers on its aircraft overhaul line late in 1958, replacing KC-97s. Field's engine overhaul facility will cut back GE J47 overhauls to about five a day within three months to provide capacity for increasing Pratt & Whitney J57 requirements. It is handling about three J57s daily now.

• An in-flight fire of undetermined origin that caused loss of a second B-52 recently disabled warning and communications systems. Pilot and copilot, only crew members to survive, evacuated when they no longer could withstand heat. Air Force investigators exonerated engines and pneumatic system as source. It is doubtful exact cause will be determined.

• Boeing has been working with Eastman Kodak on development of an aircraft proximity warning indicator for use on transport aircraft.

• Douglas Aircraft is experimenting with a system that would direct a stream of air downward from the front of jet engines to prevent ingestion: intakes picking up debris off airport ramps. Theory is that the air stream would break up intake suction. Airlines preparing for jet operations are particularly interested in this development.

• Total flying time on Vickers Viscounts now in operation has topped 340,000 hours. One BEA Viscount has logged more than 6,000 hours.

• NACA now is mapping schedules and procedures for tests in the Mach 20-30 area. Flight testing of materials on the order of 7,000°F aerodynamic heating already is under way.

• U.S. security regulations still make it impossible for foreign manufacturers to design new aircraft around American turbojets.

• First operational USAF unit to get Lockheed C-130 turboprop transports will be 43rd Troop Carrier Wing at Ardmore, Okla. Target date for first C-130s to arrive is December.

• Provisions probably will be made on Boeing 707 and Douglas DC-8 for external carriage, in an emergency, of a spare engine. Purpose is to get spares to disabled aircraft at distant points in a hurry and on a regular scheduled flight. Boeing would provide for spare to be carried in pod under aircraft between inboard nacelle and fuselage; Douglas would sling engine under fuselage.

• Morane-Saulnier MS 760 twin-jet trainer/liaison aircraft has logged more than 850 hours. Trainer is being re-evaluated by U.S. Navy. Beech Aircraft still holds licensing agreement for production.

• CAA soon will get a Remington-Rand File Computer and an International Business Machine 650 Computer for its work in developing an automatic air traffic control data processing system.

• Co-location of Tacan and VOR navaid facilities is not certain for implementation of the Vortac common system. Two systems may be located as much as 1,000 ft. apart and Tacan may be located on 100-ft. towers.

• Swedish Air Force has turned to Australia for drones, has ordered a number of Jindivik Mark 2s as guided missile targets.

• Belgium's SABCA is to assist Fokker with production of F-27 Friendship. Initially it will build production tooling for Dutch company, but if Sabena or Belgian Air Force orders the transport, SABCA will get into component manufacturing field.

• Britain's Blackburn Beverley transport is being tested with RAE Scarab ATO rockets. Using 10 of the 6,000-lb.-thrust rockets, the 135,000-lb. aircraft takes off with a run of 1,200 ft. from grass strip.

Candid cameraman shoots at 600 m.p.h.

Designed to reconnoitre at near-sonic speeds, from the stratosphere or at treetop level, the Douglas RB-66 brings new flexibility to the task of gathering military information.

Compact and hard to spot, combining long range with blinding speed, the Tactical Air Force's RB-66 is suited to swift passes at enemy heartland where—in photo-reconnaissance—its cameras pry into details of defense, transport, and manufacture. The Douglas RB-66 is equipped to fly night or day missions in any weather.

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DRASTIC SHAKEOUT MAY BE COMING in number of highly advanced vehicles now under development for delivery of thermonuclear weapons. USAF decision to delay the WS-110A chemical bomber and to stretch out Convair's WS-125A nuclear bomber project may be just the beginning (see page 14).

Besides chemical and nuclear bombers, USAF has six new weapon systems in the works: Convair supersonic B-58 bomber, Northrop Snark and North American Navaho air-breathing missiles, Douglas Thor mid-range ballistic missile, and Martin Titan and Convair Atlas intercontinental ballistic missiles.

Each of these costs $200 million or more to develop to maturity. USAF can't keep them all going with the $625 million allotted for fiscal 1957 research and development. Pinch will be even more severe in later years when more of the projects get into the hardware and test stage.

Answer is more funds or less development work. Since Defense Secretary Wilson seems determined to hold the line as much as possible on big spending increases, it appears that more "de-emphasis" of these projects is in the works.

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RUSSIA IS NOW TESTING a ballistic missile rocket engine of 120 metric tons thrust, according to U.S. intelligence reports. This is equal to about 265,000 pounds—almost double the power of the largest liquid-propellant engine known to be under test in the U.S. The Soviet powerplant could provide first-stage propulsion for a large mid-range (1,500-mile) ballistic missile. It might power the first stage of an intercontinental (5,000-mile) weapon if payload were limited.

Largest liquid engine now in operation in U.S. is the 75,000-pound-thrust Redstone motor. A 140,000-pound liquid booster motor for the Navaho is known to be in the test stage. And substantially larger powerplants are believed to be coming along in the USAF ballistic missile program.

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U.S. NAVY AIR STRENGTH in troubled Middle East consists of carrier-based fighters equipped with Sparrow and Sidewinder air-to-air missiles. Although foreign aircraft may have speed and altitude edge over present Navy fighters, the missiles are counted on to offset these advantages.

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MILITARY IS INTERESTED in possibilities of "free radicals" as rocket propellants. These may lead to even more revolutionary results than those expected from "zip" fuels now under development for future turbojet engines.

Free radicals are solitary atoms of hydrogen, nitrogen, oxygen and other substances. They're normally found in pairs in nature. When separated and re-combined, the atoms release much larger amounts of heat energy per unit volume than the most powerful propellant combinations now used in rocket motors.

Paired atoms can be disassociated easily enough through application of heat. Trick is to store them in large quantities until their energy is needed. Only presently-known method is super-refrigeration. This may be too cumbersome for rockets. Development of bulk distillation and simpler storage methods may be the answer.

WIG-O-FLEX couplings save 46 pounds on North American F-100c

xible union for connecting rigid tubes

THE WORLD'S FIRST supersonic speed record holder—the North American F-100C SUPER SABRE—is 46 pounds lighter because WIG-O-FLEX Couplings replaced standard AN connections and cut hose. G-O-FLEX Couplings weigh 1/5 as much as standard AN connections they can replace.

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FBI Probes Northeast Stock Activities

Top CAB and industry officials, as well as purchasers of stock, face more questions about 'leak' on route decision.

By WILLIAM V. HENZEY

Civil Aeronautics Board's August 2 decision in the New York-Florida Case may be in jeopardy as major investigations of activities connected with that decision have assumed explosive proportions.

At press-time, in a situation marked by fast-moving developments, the Justice Department investigation, conducted by the Federal Bureau of Investigation, had been turned over to a Federal Grand Jury. Simultaneously, an intensive preliminary investigation by the powerful Senate Permanent Investigating Subcommittee was about to give way to a formal investigation and public hearings.

The controversial CAB decision, major phase of which dealt with an extension of Northeast Airlines' routes from New York to Miami, is slated to become effective November 27. Petitions for reconsideration were filed late last month and, barring a stay of the effective date, CAB will act on such petitions before November 27.

• **The Grand Jury probe** grew out of an intensive FBI investigation in which all top CAB officials, industry officials and purchasers of NEA stock on August 3 were questioned. Much of that testimony was taken under oath. On October 16, the case was turned over to the Grand Jury to determine possible violations of a Federal statute dealing with conspiracy to defraud the Government.

Officials who, during the past two months have been questioned by two and sometimes three separate investigative units, were subpoenaed for command performances before the Grand Jury. Future of that investigation, of course, hinges on whether or not an indictment is returned. If it is, then the Government will prosecute in the Federal Courts.

Matching, perhaps exceeding, in intensity is the preliminary probe of Senator McClellan's Investigating Subcommittee which, since early September, has had two full-time investigators assigned to the case.

• **The Senate Banking & Currency Committee** secured initial files but has not activated an investigation of its own. Securities & Exchange Commission was first on the scene but since has taken the sidelines in deference to the high-powered FBI investigation.

Initially, the question before all investigative groups was who was responsible for the "leak" of CAB's August 2

They Bought Stock in Northeast Airlines

With no implications of any wrongdoing by any of the following intended, AMERICAN AVIATION presents what is believed to be a reasonably complete list of persons who bought NEA stock on August 3:

Name	City	Broker
Anthony Alleilo	Brooklyn, N.Y.	Whitehall Securities
Benjamin Alleilo	Brooklyn, N.Y.	Whitehall Securities
Thomas Alleilo	Brooklyn, N.Y.	Whitehall Securities
Nancy A. Beroyles	Atlanta, Ga.	E. F. Hutton & Co.
Jack N. Blinkoff	New York, N.Y.	Thomson & McKinnon, Whitehall Securities & L. A. Mathey & Co.
Frank M. Butterfield	Atlanta, Ga.	E. F. Hutton & Co.
Forrester A. Clark	Boston, Mass.	H. C. Wainwright & Co.
Edgar G. David, Jr.	Atlanta, Ga.	Merrill Lynch, Pierce, Fenner & Beane
Adele DeLoria	Forest Hills, N.Y.	Mabon & Co.
Marshall R. Diggs	Wash., D.C.	Bache & Co.
J. Wither Dunn	New York, N.Y.	Fahnestock & Co.
Richard W. Eddy	Concord, N.H.	Paine, Webber, Jackson & Curtis
Charles W. Evans	New York, N.Y.	Fahnestock & Co.
Morris Forgash	New York, N.Y.	Lowitz & Co.
H. R. & E. C. Geiger	Falls Church, Va.	Jones, Kreeger & Hewitt
Dr. Benj. Glasser	New Brunswick, N.J.	Eisele & King, Libare, Stout & Co.
H. C. Gwinn	Chicago, Ill.	Lamson Bros.
Lt. Francis Happerty	APO, San Francisco, Calif.	E. F. Hutton & Co.
Arnold L. Heller	New York, N.Y.	F. I. duPont & Co.
Hardy K. Maclay	Wash., D.C.	Merrill Lynch, Pierce, Fenner & Beane
Anna G. Manning	Falmouth, Mass.	Lee Higginson & Co.
Joseph Mattison, Jr.	Chestnut Hill, Mass.	White, Weld & Co.
Lowell Mayberry	Boston, Mass.	W. E. Hutton & Co.
Frances P. Michael	Wash., D.C.	Jones, Kreeger & Hewitt
Edwin Muller	Mineola, N.Y.	Whitehall Securities
Fanny I. Pofcher	Fitchburg, Mass.	E. F. Hutton & Co.
Louis Regenstein, Jr.	Atlanta, Ga.	E. F. Hutton & Co.
Maurice Rosenblatt	Wash., D.C.	Walston & Co.
Albert H. Ruppar	Wash., D.C.	Jones, Kreeger & Hewitt
Thomas Shannon	Concord, N.H.	Paine, Webber, Jackson & Curtis
Milton Shapiro	Concord, N.H.	White, Weld & Co.
Herman Simms	Atlanta, Ga.	E. F. Hutton & Co.
Robert R. Snodgress	Atlanta, Ga.	Clement Evans & Co.
Irving & Leon Smith	New Brunswick, N.J.	Eisele & King, Libare, Stout & Co.
Mrs. Gene Troth	Riverside, Ill.	Hornblower & Weeks
Frances Walsh	New York, N.Y.	Fahnestock & Co.
Chester Wiggin	Concord, N.H.	Paine, Webber, Jackson & Curtis
Wyco Realty Co.	Boston, Mass.	Harris, Upham & Co.

action which resulted in a burst in NEA stock on August 3. CAB did not release its findings until August 10. But it is now becoming apparent numerous "leaks" took place and major phases of the investigations deal with matters far beyond the mere "leaking" of a Board decision.

The scope of the investigations has created an atmosphere in Washington and east coast industry circles unparalleled since the mail contract scandal period in the mid-thirties.

One major facet expected to get a public airing involves an apparent plan, put in motion last Spring, to acquire controlling interest in Northeast Airlines and, if successful, re-sell such interest to the Trans American Airlines non-scheduled group.

• **Controlling interest** in NEA, of course, is held by Floyd B. Odlum's Atlas Corp. Odlum has stated publicly he has had no dealings with Trans American and has no intention of selling to that group, if he sells at all.

But investigators are interested in the group that hoped to acquire Odlum's interest. Questioned in this respect have been Raimond Bowles, public relations official of Manchester, N. H.; Laurance Henderson, former aide to Senator John Sparkman's Small Business Subcommittee, former aide to Senator Ralph Flanders, and who recently resigned from Trans American to join Fairchild Engine and Airplane Co.; and Gillis Long of the Washington law firm of Ansberry, Long, and Warner.

Also, CAB Vice Chairman Joseph P. Adams, who cast an important vote in the 3-2 decision for NEA, who was unalterably opposed to a fourth carrier getting in that market, and who, for the first time in the current series of major route cases, dispensed with his usual dissent in favor of Trans American; Hardy K. Maclay, counsel for Trans American, who turned up on SEC lists as one of the purchasers of NEA stock on August 3; and Maurice Rosenblatt, active in Trans American affairs, who also turned up as an August 3 purchaser of NEA stock.

At this stage, none of the people involved have been charged with illegal acts or accused of being involved directly with the "leak" or "leaks" of the Board decision. Such charges or accusations would follow only (1) if the Grand Jury returns an indictment and/or (2) if the Senate investigating unit's forthcoming formal probe convinces Senators that charges should be made.

• **Another phase** under active investigation is a reported party held in Washington on the night of August 2, immediately after CAB's "private" vote for Northeast. CAB Member G. Joseph Minetti is reported to have asked directions to "Brandywine Street" after the Board meeting and investigators are exploring to see if Minetti's destination was the home of former CAA official Albert J. Forte, 4848 Brandywine St., N. W., Washington.

Questioned or slated for questioning are Minetti, Forte, and various Brooklyn and New York persons whose names turned up as August 3 purchasers of NEA stock.

Earliest phase explored dealt with an August 3 stock purchase by Robert R. Snodgrass, Atlanta businessman and a top figure in Republican party circles in Georgia. The purchase by Snodgrass plus similar purchases by three aides of Senator Styles Bridges (R-N.H.)—Richard W. Eddy, Thomas Shannon and Chester Wiggin—were publicized in syndicated columns as stemming from apparent leaks from CAB Members Harmar D. Denny and Chan Gurney.

Denny allegedly tipped off Delta's Washington official Robert L. Griffith. Gurney, it was implied, was the source of information for the Bridges' aides. Both have vehemently denied the rumors and, it should be emphasized, other Board Members have likewise denied any leaks.

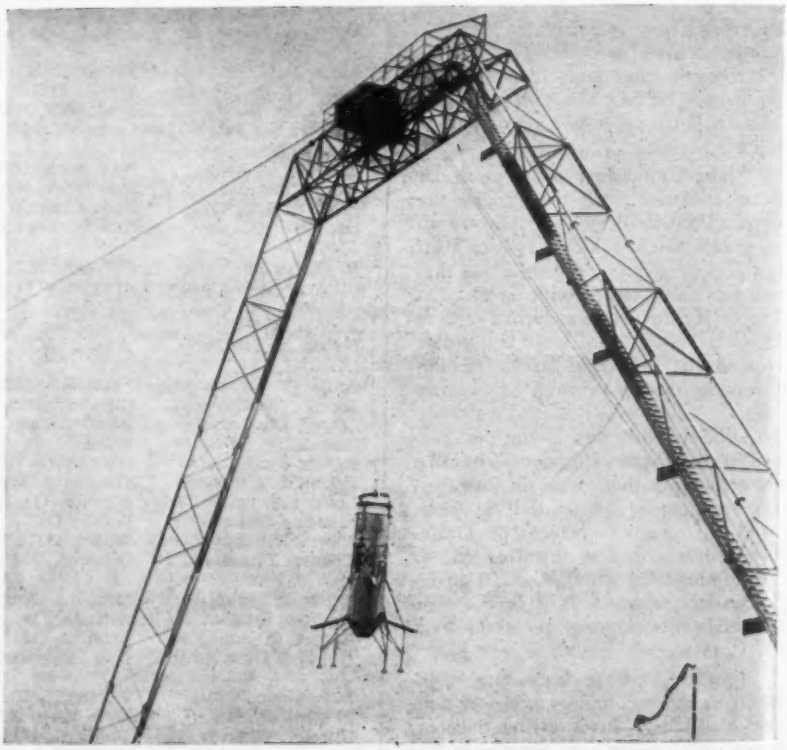
But events surrounding the early allegations against Denny and Gurney have stirred still another phase of the investigations. Denny and Gurney were a minority voting against the Northeast route award. They favored Delta. They also proposed, at the August 2 Board meeting, that CAB consider adding Delta as a fourth carrier in the New York-Miami market with a required stop at Atlanta. This proposal was slated for a further meeting on August 9.

But on either August 8 or 9, files are not certain which, CAB Chairman James Durfee was apprised of the Atlanta stock purchases by Snodgrass and others and apparently told that Denny and Gurney were the leaks to Delta and Bridges. Durfee reportedly decided then to call in the SEC for a formal investigation. Delta, of course, never got the fourth carrier award when the issue was presented subsequently.

• **Investigators have questioned** a wealthy young Washington and Florida promoter named John Marks in connection with Durfee's call for an SEC investigation. Marks, who was once affiliated with Aircoach Transport Association, is reported to have visited Durfee personally on or about August 8 or 9.

Previously, the only persons who purchased NEA stock on August 3 whose names have been publicized have been Snodgrass, the three Bridges aides, and former CAB employe Albert H. Ruppar. ◆◆◆

French Entry in VTOL Race



France's Flying Atar VTOL test vehicle is remotely controlled from "pillbox" in right foreground. Cables attached to it are for safety purposes only. Built by SNECMA, Flying Atar weighs 5,600 lbs. (with fuel) and develops a maximum thrust of 6,200 lbs.

BRITISH EXPERT TELLS WHY . . .

British Aviation Industry Lags Behind U.S.

By ANTHONY VANDYK

Britain should cease trying to compete with the U.S. in the scope, variety and size of its aircraft, missile and engine projects, in the view of Air Commodore F. Rodwell Banks, a British expert particularly familiar with the American scene.

Speaking to the Royal Aeronautical Society, Banks painted a gloomy picture of present-day British aviation. He described the Royal Air Force as about fourth in quality of equipment among the air arms of the world, ranking after the air forces of the U.S., Russia and Sweden.

The cause of this situation is partly ascribed by Banks to the inordinate time taken to issue an Air Ministry requirement so that the Ministry of Supply can take procurement action (Banks is particularly well-informed in this area since for many years he headed engine procurement in the Ministry of Supply). Furthermore the British aircraft industry is not always alive early enough to the implications of the new look in aircraft and fails to prepare itself for the much greater technical needs of the day.

Indiscriminate Ordering?

The net result is that, because of more or less indiscriminate ordering "off the drawing board," very little reaches the production stage. Banks notes: "Even some of the more straightforward projects have failed to attain their performance standards and have either had to be ordered only in very limited quantity (to give the RAF something) or have been finally cancelled."

• **Banks is particularly critical** of the "off the drawing board" method of ordering. It is his firm conviction that in recent years the windtunnel has not been sufficiently or adequately used to avoid some of the troubles that have been experienced in British prototypes.

Banks, who is now with the Bristol Aeroplane Co., asserts that the aim must be to cut lead time—commonly accepted in Britain as being from seven to ten years for a bomber—by half, if an aircraft is to be of any real use to the RAF. This can only be done by better research and experimental facilities and larger specialists, technical and engineering staffs in the aircraft companies.

Banks notes in the U.S. it was realized soon after the war that the increasing complexity of military aircraft required many more concentrated engineering manhours in the development period of aircraft. He points out that while engineering manhours increased from 1,700,000 for the North American F-86A to 4,800,000 for the F-100A, the difference in elapsed time between the two basic types was only a matter of months.

The British expert considers that when a requirement is issued by the Air Ministry to the Ministry of Supply, the latter should select only one or two companies to tender for it. The previous practice of letting all likely bomber (or fighter) builders tender, is not practicable today, since it ties up too many valuable technical staffs that should be doing other useful things or else redistributing themselves and augmenting the technical and design departments of the more successful organizations.

• **But the first step** in the ordering process of new weapon systems must be the creation of an adequate and efficient system of project evaluation, Banks says. The assessment team for this purpose, which would be a mixed one of military and civil scientific personnel, should be located in the Ministry of Supply. It must be the authoritative body, using the Royal Aircraft Establishment and other such organizations in an advisory capacity.

Contracts should then be awarded selectively, he believes, to those firms most likely to meet the commitments in reasonable time, avoiding consolation prizes in the form of prototype and limited production orders which have so often been given to the "second best."

Requirements Must Be Specific

In formulating a requirement the weapon(s) only cannot be considered by itself, but the whole problem must be put to the aircraft industry to solve in the best possible way, Banks considers. In other words, the requirement might be worded as follows: "To evolve a complete weapons system to intercept and destroy at (say) 50 miles from shore an attacker flying at a Mach 2 at 70,000 feet."

This would involve completely coordinated "weapons system" groups within the companies tendering for the requirement who would advise and then work hand-in-hand with the design staffs. The only alternative is to use an outside "weapons management unit" of the type existing in the U.S., such as the Ramo-Wooldridge and Rand corporations.

Banks believes that it is impracticable arbitrarily to consider (as voiced in some British quarters) a banding together, by Government decree, of the various and individual firms into larger units. In other words it is a "sink or swim" philosophy which should actuate government procurement, and the weakest must go to the wall or accept

SBAC Optimistic: Thinks U.S. May Be Left Behind in Jet Development

The Society of British Aircraft Constructors, in a remarkable statement, said "the belief is growing in certain quarters in the U.S. that perhaps the American industry is going to be left behind in the next jet development stage." It added:

"In 1965 or thereabouts, when DC-8s and 707s are still entering service, the British may produce still faster aircraft equipped with high-lift devices for really slow takeoff and landing . . . which would render the American jets obsolete in performance and, perhaps, economy—white elephants in fact."

The British trade association also explained why, in its opinion, "a great industrial power like the U.S. got left behind in turbine transport development." This lag is attributed to "American airline requirements being dictated to a large extent by government needs."

SBAC asserted that "it was not until the USAF foresaw the need of a fast tanker to refuel its B-47 and B-52 jet bombers that the adoption of pure-jet airliners—in which America at that time had little faith—was considered." It also declared that "until very recently anyway, there was no call for military turboprops in the U.S. and civil development suffered accordingly."

SBAC noted that, of the 610 turboprop transports on order in the free world, 437 are British types. Furthermore, of the 243 turboprop aircraft on order in the U.S., 100 are British. (No mention was made by SBAC of the fact that almost all turbojet airliners presently on order in the free world are American types.)

work from the successful companies—either to supplement the production rate by building the complete aircraft or as subcontractors for components.

• **Banks notes** that the United States has used extensively, both for aircraft and engines, the "shadow" and subcontracting schemes. He cites one engine firm that reached a peak production during the Korean war of about 750 jet engines per month with an administrative, engineering and production total of only 12,000 personnel. This was made possible by buying from specialist firms completely machined components, such as bladed turbine wheels and shafts and combustion-ware, etc.

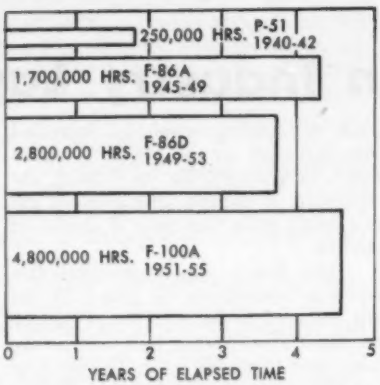
When production was cut, "in one fell swoop," to 100 units, or less, per month, it did not result in complete disorganization within the company, and not too large a mass of labor was thrown out of work in one area. In fact, the company has managed to keep employment at a reasonable level by applying for, and being awarded, a USAF contract for repairing its own engines.

Discussing Britain's competitive situation as compared with the U.S. engine industry, Banks considers that the U.S. "is not now behind us and has one or two equally good engines, even if all its engine firms do not measure up so closely, one to the other, as ours." He says Britain is at some disadvantage compared with the American engine industry in that with its large military and civil production, and with so many aircraft flying, the U.S. engine builder is presented with a statistical appraisal of the behavior of his product that is impossible otherwise to obtain.

Banks notes that U.S. engine manufacturers have elaborate facilities for testing gas turbine engines at altitude conditions, closely simulating those of flight. Supplementing such plant in the individual firms is similar equipment available through the USAF, the Navy and NACA. While some in Britain have questioned the need for these facilities, and have said that their use has not resulted in superior compressor or engine performance, the lack of them might have produced much inferior engines.

Further, it is practically impossible to know beforehand how an engine is likely to perform in an aircraft flying at, say 60,000-70,000 ft., at Mach 2.5-3 without such facilities. And, Banks asserts, it will be risky and somewhat late to wait until the actual aircraft (which has cost millions of manhours to engineer and manufacture) is ready to fly.

Banks notes that analogue and digital computors are considered indispensable by the U.S. aircraft industry and all the engine manufacturers without exception use these electronic mathematical aids.



Illustrating U.S. ability to get fighters into production fast, despite increasing complexity, this chart shows calendar time and engineering manhours required from start of design to acceptance of 200th unit. All four models are North American fighters.

The use of computers does not reduce the need for technicians; rather the reverse, but the operation of the equipment by skilled and knowledgeable personnel eases the load on the individuals in the design and performance calculating teams and allows an enormously increased volume of work to be done, thus expediting the whole design process and ensuring greater certainty in the rightness of choice of the final engine (compressor) design. In fact, it enables better engines to be evolved.

• **Turning to the civil aircraft scene,** Banks says Britain does not have the domestic (military and civil) market of the U.S., representing over 60% of the world's civil aircraft requirements. This gives the U.S. an almost overwhelming advantage in acquiring elaborate production equipment and stabilizing the industry at a good working (capacity) level.

He considers that there is a minimum size or capacity for a company producing civil aircraft if it is to meet the rate needed to execute orders in reasonable time, and also to cater for the individual customer's needs; and profitable manufacture will be very difficult to achieve if production (with about 50% subcontracting) is less than about 10 large (150,000-300,000 lb.) aircraft per month. Banks believes this is a realistic figure if Britain is to think of competing with the U.S. and calls for much larger production units if it is to be considered at all.

Capital Important Factor

These production rates cannot be achieved without the commensurate capital expenditure on the very expensive and elaborate tools and tooling of the type now in general use in the U.S. In fact, it is hardly possible to attain the low structure weights and, equally important, the large degree of quality in the modern airframe without the large presses, the "sculpturing" machines or skin millers, the stretch-forming equipment and even the automatic riveting machines which American industry is employing today.

• **Summing up his views** on the civil aircraft picture Banks says: "If Britain is to sell against America and probably Russia, we must get organized into larger technical and production units or give up the idea of meeting this very heavy competition."

Despite the success of the Viscount, he believes that Britain should not deceive itself that U.S. airline operators will buy British in the future unless Britain can continue to compete qualitatively and quantitively with U.S. manufacturers and offer something very attractive in performance and delivery. To succeed Britain must start with a good look at the methods of the American aircraft industry and then adapt and modify its techniques and procedures to its own needs, Banks suggests.

Looking to the future, Banks says that, with full government support, Britain can meet its own and some of the world's needs in military and civil aircraft and engines. Whether it could "leap-frog" the large supersonic civil jets and go for a supersonic aircraft is a moot point, but it would require an expenditure in money and time of at least $150,000,000 (for design, research, two prototypes and production tooling) and 10 years to do this. And it could be a disastrous waste of effort if it did not come off or was mistimed.

There is, however, still scope left for Britain's engineering ingenuity in the field of small and moderate size (up to 150,000 lb.) aircraft, Banks believes. There is also scope in meeting the needs of specialized operators including the independent airlines, he considers.

• **In the military field,** Britain should have the supersonic bomber and the ICBM, even if only one design for each can be afforded. There is also the air defense fighter and the military transport. In the case of engines, Banks believes that Britain must go all-out to compete with the U.S. and Russia in quality and performance. And, having gone so far as a leader in aircraft propulsion, Britain cannot now afford to stand still or "die on our feet." But, Banks warns, if Britain's civil and military aircraft effort is allowed to go downhill, the effect on the engine industry will be serious.

AIRLIFT DEMONSTRATION—To show evacuation techniques in the removal and transport of light aircraft, an Army Sikorsky H-34 helicopter carries a Cessna L-19. The demonstration and the suspension arrangement were worked out at Fort Sill, Oklahoma, site of the Army's H-34 transition school. The Sikorsky H-34, the Army's newest helicopter in operational use, can carry cargo loads of up to two tons or 17 combat-ready soldiers plus crew of two.

HELICOPTER HISTORY

H-34 SPEED RECORDS

In July, 1956, an Army Sikorsky H-34, flown by Capt. Claude Hargett, right, and Capt. Ellis Hill, of Fort Rucker, Ala., established new closed-circuit speed records. The records were for 100 km, 141.9 mph; for 500 km, 136 mph; and for 1000 km, 132.6 mph. The previous 1000 km closed-circuit world speed record for rotorplanes, 66.6 mph., was set by a Sikorsky R-5A in 1946.

SIKORSKY AIRCRAFT
BRIDGEPORT, CONNECTICUT
One of the Divisions of United Aircraft Corporation

LAS VEGAS, NEV.—For the sixth straight year, a keen-eyed day fighter team representing the USAF Air Training Command captured first place in the gun-bomb-rocket meet at nearby Nellis AFB.

Piloting North American F-86H Sabrejets, the ATC men racked up a total of 3664 points to win the meet by a wide margin. In second place was a USAFE team, also flying the F-86H, which gathered a total of 2997 points.

• **Key factor** in ATC's victory was a superlative score in air-to-air gunnery events. So great was its score in these events that its third place in air-to-ground trials behind USAFE and an Air National Guard team was not an influential factor.

In the special weapons delivery portion of the Nellis meet, USAFE triumphed with a total of 50,588 points, closely followed by a team from the Far East Air Forces with 50,265 points.

• **Top scoring honors** for an individual pilot went to Capt. Asa Whitehead of ATC's day fighter team. With top scores in four separate events, he personally collected a total of 1,033 points. Second high individual score of 1,013 points was achieved by Capt. Calvin Davey, also with the ATC team, which is stationed at Nellis.

Meantime, at the USAF interceptor meet held simultaneously at Vincent AFB, Yuma, Ariz., first place was taken by the 94th Interceptor Squadron representing the Eastern Air Defense Force. Flying F-86D all-weather interceptors, the famous "Hat-in-Ring" team piled up 13,800 points out of a total possible score of 24,000. Its nearest rival was the Western Air Defense Team which scored 11,400 points in its Northrop F-89D Scorpion interceptors.

Top individual scoring honors were shared by Lt. Robert B. Long of EADF and Col. David Graham (pilot) and Lt. B. R. Thompson (radar observer) of the Alaskan Air Command team, which used the two-man F-89D. Each scored 4,800 for the entire interceptor meet.

One of the interesting features of the Yuma meet was the absence of the Lockheed F-94C interceptor because of a failure to qualify for the finals after meet victories in 1954 and 1955. Another was the success of the F-86D interceptor.

• **Disagreement** over the relative merits of the direct-firing rocket system in the F-86D *versus* the converging fire system of the F-89D, which uses wing pods, was a prominent point at the Yuma meet. The F-86D pilots credited their success to the direct-firing arrangement on their aircraft, but the F-89D pilots insisted that their aircraft would still have the edge in combat. They pointed out that they would normally fire a salvo of 104 2.75-inch rockets at an enemy aircraft, but were restricted to a mere 24 for each target during the meet.

Both Vincent and Nellis are looking ahead to more realistic competitions in the future. The introduction of the Falcon GAR-1 missile in next year's Vincent meet was raised as a possibility, but it was noted that drone targets would have to be used to get a proper test of the weapon's capabilities.

Jet Engine Materials Freed from Quotas

Quota controls on critical materials used in jet engine manufacture have been canceled by Defense Department. Freed metals are cobalt, nickel, chromium, columbium, molybdenum and tungsten. Reasons given for freeing them from control: improved materials utilization efficiency; optimum design of engines to minimum use of these materials, and the improved status of the stockpile.

Cancelation of the quota system took the form of a revision of Department of Defense instruction 4000.16. The three military services will continue to make annual reports of consumption of these materials by their contractors, thus industry is not altogether relieved of paper work. This way Washington will be in a position to be warned should the situation deteriorate and thus require reinstatement of controls.

Douglas Reveals Plans For 500-mph Turboprop

A 400,000-lb., 500-mph turboprop with a 1,500-3,500 mile range depending on load has "moved from the drawing boards into actual fabrication" and the "revolution in air logistics which we heralded two years ago is near," according to Donald W. Douglas, president and chairman of Douglas Aircraft Co.

Douglas, speaking on acceptance of the 1956 National Defense Transportation Award, was believed to be referring to the C-132, which his company is developing for the USAF.

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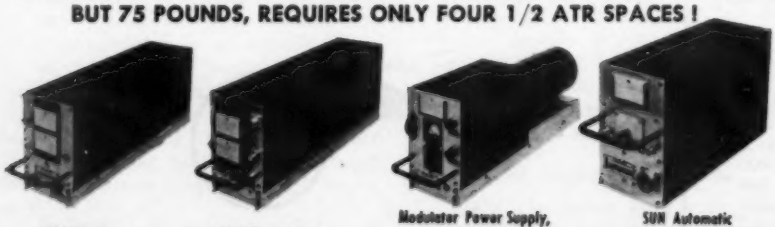

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Jets Delay Piston Engine Ignition Progress

By JOSEPH S. MURPHY

TOLEDO, O.—The turbine engine may be the coming panacea for airline spark plug and ignition problems, but until they actually arrive, the jets are doing more to hamper than help today's situation.

By their existence alone, they are slowing piston engine accessory improvements to a snail's pace. With production of most piston types at its lowest point, engine builders have little, if any, test time available to prove out new accessory items.

As a result, such accessories as spark plugs and ignition components, the biggest contributors to airline flight delays, are left wanting for the engine manufacturer's stamp of approval for months.

• **This situation** became increasingly more evident here when Champion Spark Plug Co. held its 12th Annual Spark Plug and Ignition Conference.

Repeatedly, throughout the three-day session, ignition specialists from 20 U.S. and eight foreign airlines came face to face with the problem—how to get improved spark plug models into operation sooner.

Champion, as an example, told of several new plug programs now under way. But it was quite obvious in their inability to pin down exactly when the new plugs would be available, that all are stalled by the lack of endorsement of one or more manufacturers.

• **Although** its so-called "throw-away" spark plug, a key topic of discussion for the third consecutive year, has seen military service on a wide scale basis, the airlines have yet to reap its economic benefits. These plugs, now carrying the nondescript title of "Phase I Modification" plugs, have won blanket approval from Curtiss-Wright for R3350 and Turbo Compound engines, but Pratt & Whitney has withheld its endorsement until more experience is gained.

Two New Developments

In addition, Champion disclosed two new plug developments, both using massive electrode designs having two instead of four ground electrodes. Plugs sent to P&W months ago have yet to gain an hour's time on a test engine. Those sent to Wright fared only slightly better, accumulating about 17 hours since May.

• **The new Champion designs** are aimed at widening the effective heat range of the plug and reducing pre-take-off fouling difficulties, experienced by many airlines. Both plugs feature a relatively long nose insulator for a given pre-ignition rating, new electrode alloys and the two-prong ground electrode.

The latter, in addition to providing better anti-fouling characteristics, is also expected to facilitate spark plug cleaning.

Both of these features appear vital to improved plug operation, according to reports of airline experience heard during the conference.

• **For example,** a number of airlines reported on service tests conducted with competitive AC-285 "fine wire" plugs as a measure to combat the fouling situation. American Airlines' C. C. Mitchell said AA is conducting tests with fine wire plugs in the No. 1 and 2 engines. of 25 Douglas DC-7s, using Champion R-103 massive-electrode types in the Nos. 3 and 4.

In virtually every instance, carriers conceded that the fine wire plug excels in anti-fouling performance. The big problems facing the airlines, however, are two. They apparently have to choose between bearing the increased cost of the fine wire plugs (most use platinum electrodes), or establish bothersome end-of-the-runway "burnout" procedures to make sure that fouling of massive electrode plugs doesn't result in deterioration of engine power during takeoff.

Carriers in general, however, agreed with AA's Mitchell that engine performance, reliability and long life occupy the spotlight in deciding what plug will be used. Cost, although important, takes a back seat and is not a deciding factor.

One other facet of Champion's proposal for a two-prong ground electrode is the effect it might have in lessening the cleaning problem now faced with the four-prong type. One carrier reported the need to bend back ground electrodes in order to do a satisfactory cleaning job on present four-prong types, obviously an undesirable and time-consuming operation in the cleaning process.

However, in each instance, the answers to these problems seemed to rest with improved plug designs—designs that now take a long time to process through engine manufacturers for approval.

• **One possible solution,** briefly hinted at during the meeting, would be a joint airline effort through the Air Transport Assn. to get something done about it.

A suggested path of action would have the airlines, rather than engine manufacturers, do the test evaluation during day-to-day post-overhaul running of engines in their test cells.

In this way, a group of major airlines—American, United, Eastern, TWA and Pan American—no doubt could accumulate several hundred hours on new plugs in a week, a figure it would take months for an engine manufacturer to match.

True, the process would involve extra work, shifting of plugs from one engine to another, record keeping, etc. However, these relatively minor disadvantages probably could be ironed out in some general agreement with the spark plug or accessory producer seeking approval.

But whether any action will be taken on such a program appears to rest solely with the airlines. It just about boils down to whether or not they want improved spark plug and ignition equipment for piston engine aircraft enough to do something about getting it.

• **The suggestion** that ATA look into the matter is on the record, but ATA can't take any constructive steps unless the airlines say they want such action.

The answers should come soon, however, as the once-a-year opportunity to thrash out such subjects comes up this month in Colorado Springs.

The occasion is the annual ATA engineering and maintenance conference. ◆◆◆

Comparison of Plug Types

Introduction of new "throw-away" series spark plugs doubles the number of Champion models the military services and airlines will be handling until changeover is completed. List below shows old and new designations and color code used to identify plugs.

Old Type	New Type	New Plug Color Code
R33S	REA29N	Black
R56S	REA32N	Lavender
R37S-1	REA37N	Aluminum
R819	REA87N	Aluminum
R103	RHA29N	Black
R111	RHA32N	Lavender
R115	RHA37N	Aluminum
R119	RHA87N	Aluminum
RC26S	RED39N	Aluminum

NOTE: New types use a .865-.870" diameter gasket seat, have no zinc plating on shell, but are painted from flange to relief below terminal threads. Glaze is also eliminated from terminal barrel of ¾"-20 models.

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VETERAN INSTRUCTOR'S VIEW:

Simulators Are Key to Jet Pilot Training

By LOIS C. PHILMUS

FORT WORTH—How will the coming jet age affect airline pilot training methods?

While it is conceded that actual transition from high-performance piston transports to commercial jets will be simple for experienced airline pilots, the jet's high speeds, increased dependence on instruments, and large equipment investments will make necessary some new concepts in overall training.

What will these new concepts entail and why?

• **Reed Pigman,** who has trained hundreds of airline pilots over the past 15 years at his American Flyers School at Meacham Field, has some opinions on the subject.

Simulators, he said, will soon take their place as the main training medium, rather than the actual aircraft. Jet planes, he contended, will be flown "very little by hand." Jet transports will be "electronically flown" and cross-country flights by autopilot, homed in on en route stations, climaxed by automatic approaches, definitely are in the planning.

Training Will Be Tougher

Because of these factors, Pigman said, "training will be more of a problem than before." Captains will still have to be able to handle the aircraft in case of emergencies, such as electronic failures. To maintain his proficiency, the pilot will have to do a lot of simulator work in instrument, emergency and failure procedures.

• **Whereas in the past** airlines have taken transports out of passenger service for training and check-out purposes when needed, the high investment in jets will make it "prohibitive" to take a jet off the line for training pilots. Observing that it cost between $40-$43 per hour for training in the $150,000 DC-3, Pigman said the ratio rises rapidly with a $4-million product.

For economy reasons alone, he continued, it "will be just as effective to teach a pilot to handle the aircraft under adverse conditions in the simulator." Actual flight checks would be reserved for takeoff and landings and final operational procedure checks, after thorough indoctrination in the synthetic trainers.

Pigman envisions "vast increases"

REED PIGMAN

in the amount of airline training, not only for proficiency checks, but because of continuing influx of new equipment for electronic flight.

This will have its influence on training of embryo airline pilots, as well. Because it would be financially prohibitive for a private training school like American Flyers to purchase a simulator for each aircraft type, Pigman feels that a standardized trainer is the answer. He is presently updating his curriculum to gear it to the new speeds and technology.

He sees his role as providing the basic flight and instrument training. The employing airline would give his graduates their final indoctrination. Now being analyzed is a plan to provide the airline student pilot with an instrument course geared to increased speed.

• **Pigman is planning** to "soup up" his basic Link trainer from its present indicated air speed of 160 mph to an IAS of 250 mph, for speed familiarization. He anticipates that the synthetic trainer manufacturers will come up with a new basic trainer for the jet age "as they have time to develop it."

Pigman believes the basic trainer will be built in process with the production of the 707 and DC-8 trainers, with comparable speed indications and a standard cockpit. The latter, he emphasized, "must be arrived at."

From the Link, his students will progress into piston aircraft which must be "reasonably priced" but which he will equip with current and future radio and electronic gear for navigation and pilotage procedures. His "student product" will then have the foundation for being a copilot, with heavy emphasis on instrument flight training.

The new co-pilot would then be ready for on-the-job training with the airlines.

Pigman predicted that the airlines would probably progress the new copilots in a "speed indoctrination" program, first assigning them to the Convair and progressively on to the DC-6, DC-7 and finally the Boeing 707 and Douglas DC-8 type jet transports.

• **On the overall problem** of finding new pilots, Pigman feels the airlines' answer may lie in college recruitment. Noting that the "variable of supply" depends on whether the military continues to hold on to its good pilots, the veteran flyer predicted that eventually airlines will begin hiring of "pure" pilots. The carriers, he said, will go to colleges and look for recruits with engineering background and "a burning desire to fly."

Weeding-Out Important

The "recruits" will be brought to private training schools for preliminaries including the famed Flanagan test. The commercial school will weed out the students as they are taught to fly, for temperament and aptitude, and about six to nine months later turn over "A-1" copilots to the airlines. The airlines will then take the students and "make captains out of them."

Pigman strongly emphasized importance of the weeding-out process. He had high praise for the Flanagan test which has cut the pilot attrition rate down from about 50% in the early stages of training to about 5%.

He pinpointed the shortage of pilots when he said that no commercial pilots have been trained because most have been taken from the military and converted to airline ratings.

• **Two serious factors** in the shortage, he said, are (1) lack of civil pilot training and (2) the large number of captains now reaching retirement age. He estimated that the major airlines will have to hire 200 pilots per year just to replace retiring pilots, plus an additional 80 for the estimated 10% that leave the airlines by attrition.

There are only three commercial schools still operating compared to double that a decade ago. Where American Flyers turned out 100 commercial pilots a year after the war, it later dropped to 25 but is now up to about 50. ◆◆◆

LOCKHEED X-7 RAMJET BLASTS U.S. MISSILES AHEAD

Today's most arresting new weapons for the nation's "Perimeter of Defense" are the ramjet-powered interceptor missiles. Capable of speeds in the ramsonic realm—far faster than today's supersonic jets—these missiles are guided in flight. Spotted at strategic points in our continental defense system, interceptor missiles will guard the skies wherever invaders might venture.

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Here, Missile Systems Division engineers analyze results of hundreds of flights to insure the performance of present-day engines—and to amass data vital to the development of radically new ramjet engines. After flight the X-7 is lowered gently to earth by parachute—saving millions of tax dollars, countless manufacturing hours.

At Lockheed Missile Systems Division more than 5,000 engineers, scientists and technicians are working on high-priority missile programs. Facilities at Van Nuys, California, are in full operation. New missile research laboratories are at Palo Alto, California, and additional engineering and manufacturing facilities are being built at Sunnyvale, a few miles away.

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CAA Ideas on How to Avoid Collisions

By HENRY P. STEIER

Despite discussions of an "ultimate system that could prevent mid-air collisions, opinion is shaping up that we can only improve the problem—not solve it.

In line with thinking that there is slim chance of collision prevention, engineers at CAA's Technical Development Center are convinced there are three basic needs for improving the chances of collision avoidance.

These are: sensing and alerting devices; increased conspicuity of aircraft; increased angles of vision for the pilot from his cockpit position.

TDC recently reported on its studies of these needs and the reasoning behind the approach it has taken.

• **The time-distance element** is at the heart of the collision reduction problem. To tell a pilot a potential danger exists is not enough. He must be given the relative bearing or direction of the danger.

He must then visually identify the aircraft so that he can execute an avoidance maneuver. To do this he must see the aircraft at a sufficient distance so that he has time for the maneuver.

Engineers working on the problem under Thomas Edwards, Chief, Instruments and Accessories Branch of TDC, believe many of the designs for a proximity warning system presented to them for review lack the backing of necessary research into operational requirements.

The Air Transport Association recently gave the nod to Collins Radio Co. to go ahead with development of its system for proximity warning. However, many other companies have ideas on how to do the job and have presented them to TDC.

• **To establish a basis** for the operational requirements of a sensing and alerting system, TDC studied the factors, conditions, patterns, etc., that have prevailed in past collisions.

From this study it concluded that overtaking of one aircraft by another is the most serious problem. The convergence angles at which the collisions took place led TDC to investigate the visibility cut-off angles from the pilot's position in three general types of aircraft.

The data showed visibility in the downward and rearward directions is the most limited. In some aircraft the visibility in the downward direction is zero. Even with a proximity warning indicator that warned of a potential hazard from below and to the rear, the pilot in such a plane would be hard put to know which way to maneuver to avoid the oncoming plane.

• **New visibility standards** are needed, TDC says, and recommendations have been submitted to CAA for improving that factor in collision avoidance. Strong recommendations have been made for incorporation of the ideas in new aircraft.

The conspicuity factor has been studied through collision simulation tests involving actual aircraft running collision courses. To tie in the results with plans for a proximity warning alerting system, TDC did some human engineering on the effect of the "awareness and direction" factor in collision avoidance.

Two Types of Tests

Using DC-3s, two types of tests were run. Called "informed" and "uninformed" phases, 128 collision courses in all were run. Flying a VOR course, some pilots were informed that a collision course was to be run prior to the run. In other cases the pilot was not informed until actually on the collision course.

The objective was to determine the distance at which the pilots in both types of test first saw the oncoming plane. In neither case was the pilot informed as to the angle of approach.

From this data the threshold of visibility distance for informed and uninformed pilots was determined. There was little difference between the two conditions. The results point to the importance of knowing the angle of approach.

• **TDC believes** the conspicuity of aircraft is an important factor in collision prevention and that any improvement of that factor will be an addition to other alleviating factors. The objective is to make the time-distance figure as great as possible.

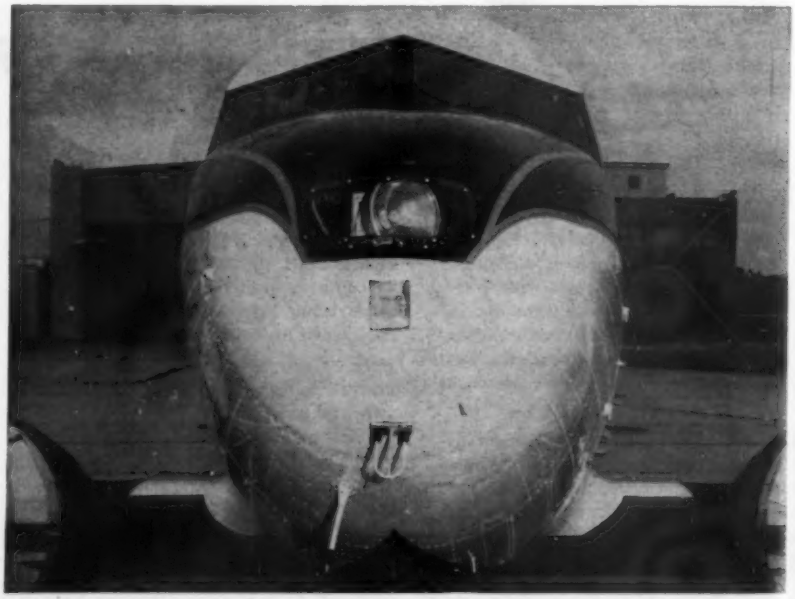
Two means are being investigated. A promising one is the use of high intensity lights for daytime operation. With a 600-watt, 500,000-candlepower lamp sweeping 30 degrees to the left and right in the nose of a DC-3, the light was visible at 14 miles while the aircraft itself could not be seen beyond 11 miles.

To further increase the distance a 900-watt, 2-million candlepower mercury vapor lamp will be tested.

Another aid to conspicuity might be gained by using a contrast improving paint on aircraft. A very bright fluorescent paint of blaze-orange color and made by Switzer Bros. Inc., known as Day-Glo, is to be tested.

Problem of Contrast

A single-engined lightplane has been painted with Day-Glo and a laboratory program is under way to select a paint scheme using stripes or other



Flashing light, that moves from side to side, was installed in an aircraft by CAA's Technical Development Center to determine to what extent it increased conspicuity of aircraft in the daytime. The 500,000-candlepower light shown increased distance at which plane was visible from 11 miles to 14 miles.

identification devices to make the aircraft most visible.

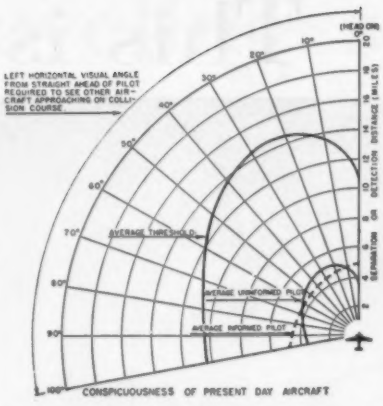
The problem is one of negative and positive contrast. The sky is light and the ground is relatively dark. The paint scheme selected must be conspicuous against both types of background.

Using paint might not be readily accepted by commercial transport operators who pride themselves upon distinctive markings and color schemes to set their planes apart. However, TDC believes an increased conspicuity paint scheme might be required for light planes some day.

Since light aircraft can hardly be expected to carry heavy electronic proximity warning systems, use of special painting might turn out to be an important contribution lightplane operators could make to air safety.

• **Proof that** Air Traffic Control from ground centers is not the answer is revealed in a study of 50 mid-air accidents that occurred from 1949 through 1954.

Fifty-four percent of the accidents occurred within one mile of an airport. Of these 96% occurred at an altitude of 500 feet or less. If these aircraft had been carrying a warning device, TDC concludes, and if it had only a one-mile range and was operable to only an altitude of 500 feet, 50% of the accidents never would have happened.


LEFT HORIZONTAL VISUAL ANGLE FROM STRAIGHT AHEAD OF PILOT REQUIRED TO SEE OTHER AIRCRAFT APPROACHING ON COLLISION COURSE
(HEADING)
AVERAGE THRESHOLD
AVERAGE UNINFORMED PILOT
AVERAGE INFORMED PILOT
DETECTION DISTANCE (MILES)
SEPARATION (MILES)
CONSPICUOUSNESS OF PRESENT DAY AIRCRAFT

Results of simulation tests with two aircraft running collision courses gave this threshold data showing visual detection distances for various angles as obtained from informed and uninformed pilots. Pilots were unaware of angles of collision course.

• **Aside from the accidents** in near proximity to airports, TDC data shows 22% of collision accidents happen in controlled areas. Realizing that safety in the air cannot be limited to close proximity to an airport, TDC is continuing its studies of visibility and collision avoidance maneuvers on the airways. It is attempting to measure, by time-distance information, the ability of aircraft to avoid collisions at high speeds and high altitudes.

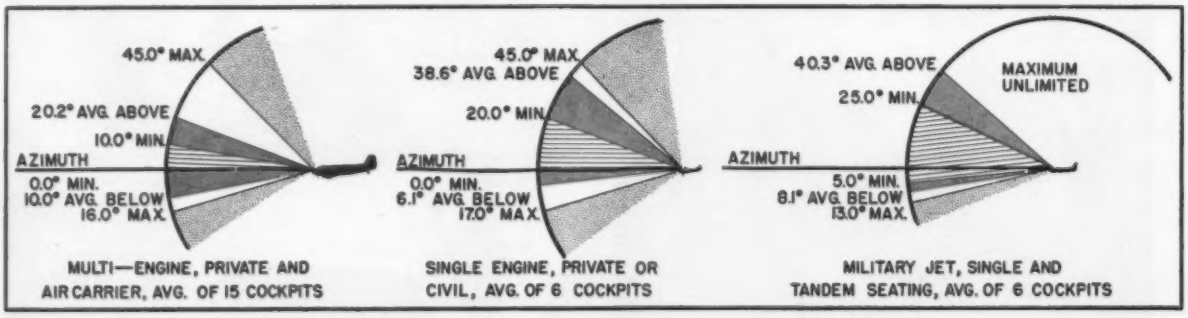
How far TDC can afford to carry this work is a big question. It takes technical evidence to prove out the relative importance of each factor in the collision problem. Under the present CAA method of funding each project on a project-bit rather than an overall basis, all TDC can do, in the word of its engineers, is to "nibble" at the serious future collision problems.

GE to Set Up New Military Operation

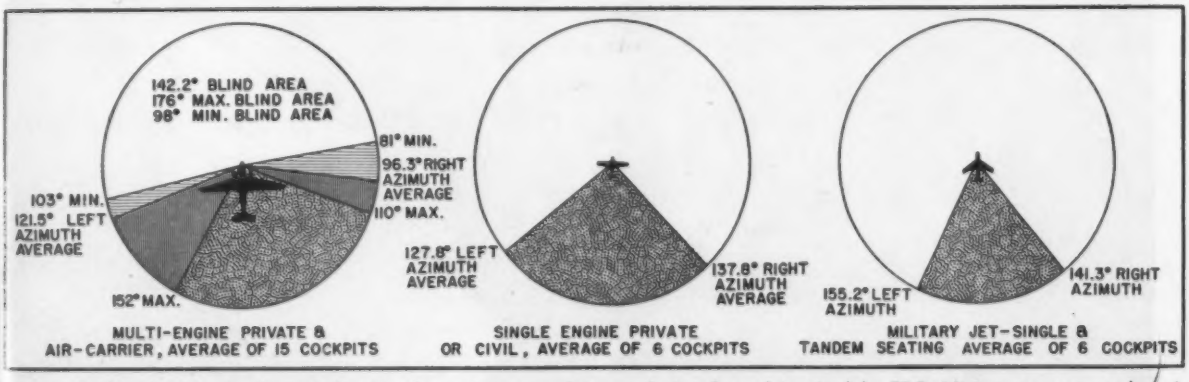
General Electric Co. will soon have a new operation to be known as the Technical Military Planning Operation (Tempo). Being organized in the Defense Electronics Division of the company, Tempo will have responsibility for future planning in complex weapons systems, according to Dr. George L. Haller, division general manager.

Manager of the new unit will be Dr. Richard C. Raymond, formerly of the Rand Corp. Haller said Tempo will be responsible for bringing together "the fruits of advanced research, the apparent course of weapons development throughout the world, and the economic and demographic factors in international conflict in order to make recommendations concerning the selection and design of future complex weapons systems."

Headquarters for Tempo will be somewhere in California.



Side-to-side vision permitted by design of various general types of aircraft.


142.2° BLIND AREA
176° MAX. BLIND AREA
98° MIN. BLIND AREA
81° MIN.
96.3° RIGHT AZIMUTH AVERAGE
110° MAX.
103° MIN.
121.5° LEFT AZIMUTH AVERAGE
152° MAX.
MULTI-ENGINE PRIVATE & AIR-CARRIER, AVERAGE OF 15 COCKPITS
127.8° LEFT AZIMUTH AVERAGE
137.8° RIGHT AZIMUTH AVERAGE
SINGLE ENGINE PRIVATE OR CIVIL, AVERAGE OF 6 COCKPITS
155.2° LEFT AZIMUTH
141.3° RIGHT AZIMUTH
MILITARY JET—SINGLE & TANDEM SEATING AVERAGE OF 6 COCKPITS

Angles of pilot vision in the forward direction for various general types of aircraft as determined by TDC. Minimum, average and maximum angles of vision are those permitted by cockpit and windshield configurations of the aircraft.

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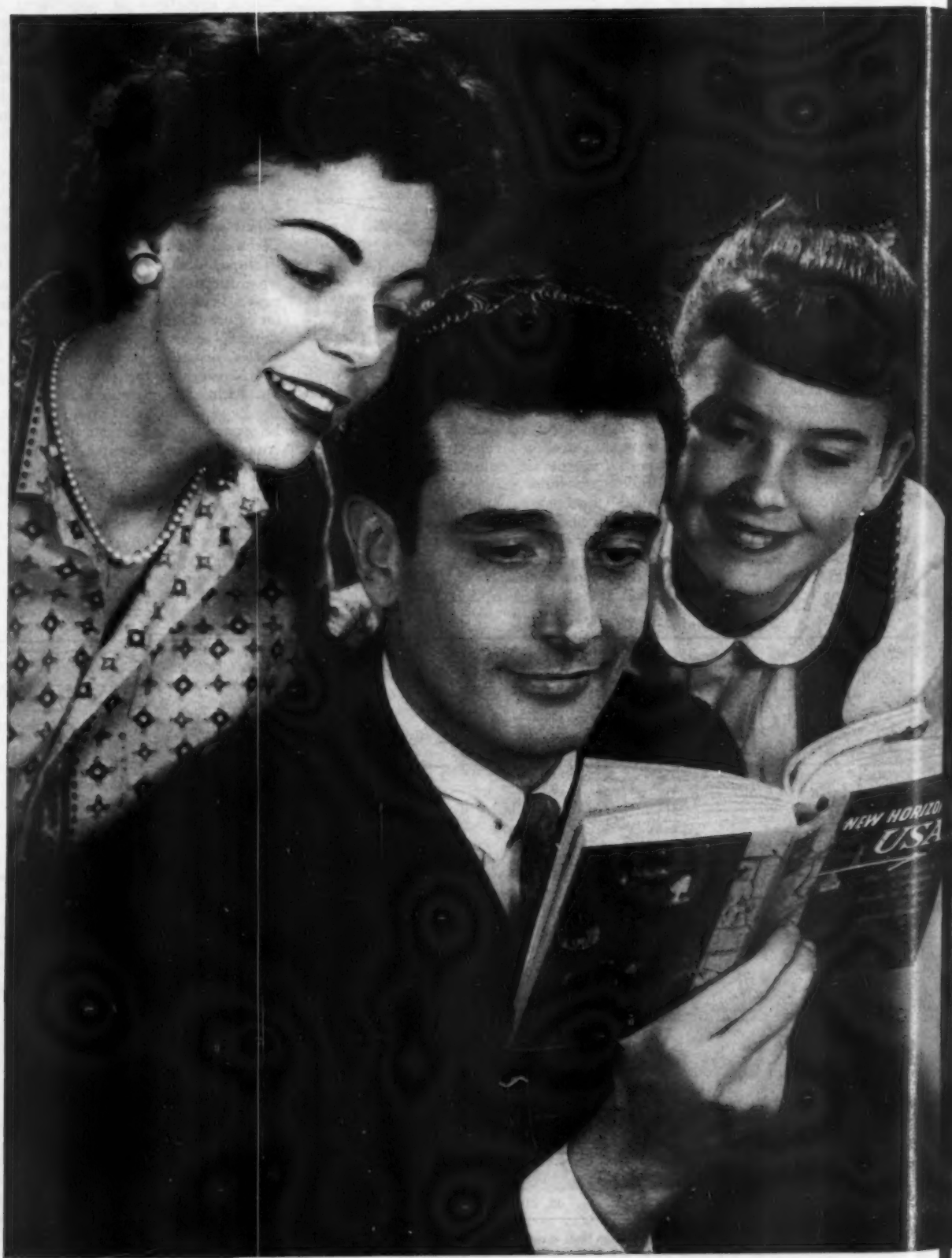

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NBAA Panel Agrees Speed Control Is Needed in Terminal Areas

By LOIS C. PHILMUS

MIAMI—Focal and vocal point of the ninth annual convention of the National Business Aircraft Association was, as everywhere, air traffic control. But instead of rehashing future concepts, NBAA confined its deliberations to the practicalities of what can be done from now until about 1959 within the confines of present procedures and equipment types.

Implementation of two specific concepts was urged by a representative nine-man panel:

• Imposition of speed control in terminal areas.

• Improved communication through the lessening of transmissions.

While there was general agreement in overall concept, the old bugaboo of degree of control again emerged among the airline, military and private representatives on the panel.

There was criticism of proposed CAA rule-making that would impose a 180-mph (156-knot) speed restriction on all aircraft but exempting aircraft types unable to conform. But the air traffic control expert for the Air Defense Command revealed that some jet fighter types cannot be safely flown below 250 knots, with some giving stall indication at 275 knots.

Further, the airlines, while favoring speed control, "don't want it to get out of hand." Huge sums of money are being invested by the carriers in larger and faster equipment, their panel spokesman, Captain Walt Jensen, pointed out. But, he added, some flexibility will be needed. He cited as an example the necessity for keeping the size of the areas controlled so that a Washington-New York flight would not have to be negotiated at 156 knots because of the restrictions of speed control areas.

Pilot Optimistic

However, Robert Sheriff, chief pilot of Thompson Products, expressed the opinion that speed control and improved reporting procedures would solve the immediate problem. Despite the drawbacks indicated by some panel members, the general consensus appeared to go along.

• **The problem of cluttered communications** elicited a suggestion from Sam Freeman, president of the National Aviation Trades Association, that some form of monitoring be instituted on the frequencies used to caution offending pilots on too much chatter.

An airline pilot proffered the possible need for a "vigilante committee" to revise terminology "to get pilots off the air." Capt. Jensen revealed that ATA plans to "tape" a series of ground/air transmissions with the aim of eliminating numerous position reports now required. He tentatively suggested some type of bi-directional reporting might be substituted for "the too many position reports" now required mainly for traffic crossing airways.

Jensen injected another note of caution when he said there might be some "disillusionment" as a result of the "cut-and-dried thinking" of putting high-speed transport at high altitudes. "We'll try to keep out of everyone's way as much as possible," he said, but added that there are now and will be times in the future where DC-7 and other high performance types must use the lower altitudes, i.e., winds or weather factors.

• **The military presentation** brought shocked ejaculations from the business pilots. A representative of North American called for altitude control more than speed control and argued that jets must be considered in thinking which must be conditioned to its functions.

Navy Shows J79-equipped Tiger

This is first photo of Grumman F11F-1F Tiger, a faster version of the supersonic F11F series. Aircraft encompasses the area rule (Coke-bottle fuselage), note pinched waist. Powerplant in newest Tiger is a General Electric J79. Original F11F was powered by Wright J65.

Strictly for the Birds: CAA Studies How to Safeguard Windshields on Jets

Jet transport aircraft cruising at 400 to 500 miles an hour have reopened the question of what happens when windshields and engines strike birds in flight.

A new air gun to propel chicken carcasses was recently built by CAA's Technical Development Center to investigate jet age bird-collision problems. The new 2,000-mph gun replaces the old 350-mph gun that was abandoned after windshields that were resistant to the impact of birds up to 350 mph were developed in 1948.

Now evaluation tests on the Boeing 707 windshield are being run by TDC in Indianapolis with the new gun calibrated up to a chicken-carcass velocity of 450 mph.

• **Propulsion is provided** by a large volume of compressed air. Chickens are placed in a cloth bag container and inserted in the gun's breech. Between the chicken and the compressed air tank a plastic disk is inserted. A built-in 22-calibre gun mounted at an angle to the disk is fired to puncture the disk. The rupture releases the full force of compressed air to propel the carcass.

The 707 uses a three-layer windshield. Two layers of glass with clear plastic between the layers form a 1⅛-inch-thick windshield. The plastic is coated with conductive material that carries electrical current to keep the windshield heated to 90-100°F. The windshield has maximum strength when kept at this temperature. A sensing element in the glass keeps the temperature constant.

Although the Boeing's windshield cracks up when struck by a bird at 450 mph, there is no penetration. Glass does fall off the inside layer, and tests with clay human figure dummies indicate some minor hazard to the pilots is present. Extent of the fall-off depends upon the angle of strike.

• **TDC officials** say the 707 will be certificated for windshield safety but that some provision under new regulations might be needed to eliminate the minor hazard. This means that under 8,000 feet, above which birds are not known to fly, pilots may be required to wear goggles or insert a plastic shield between them and the windshield.

The DC-8 windshield will be tested in March 1957 and Convair may ask for tests on its Golden Arrow jet transport, according to TDC.

Problems of bird ingestion into the intake of jet engines are also being evaluated. Thus far tests show little damage to turbine blades at 450-mph bird velocities. However, after ingestion the engine must be stopped very quickly since blockage of the intake sometimes causes a rapid rise in the inlet temperature that could melt the inside engine wall. This is especially true when the engine is operating slowly.

A minor but annoying problem is that four-pound chickens must be used for the tests. This weight was decided to be the best for uniform tests, but procurement of that exact weight is sometimes difficult. TDC grows its own.

A Boeing 707 windshield struck by a bird at 450 mph looks like this. CAA's Technical Development Center is evaluating effects of in-flight bird collision with jet transport windshields and jet engine ingestion of birds. Clay dummy at right is used to test effects on human beings of glass thrown off inside layer of windshield upon impact.

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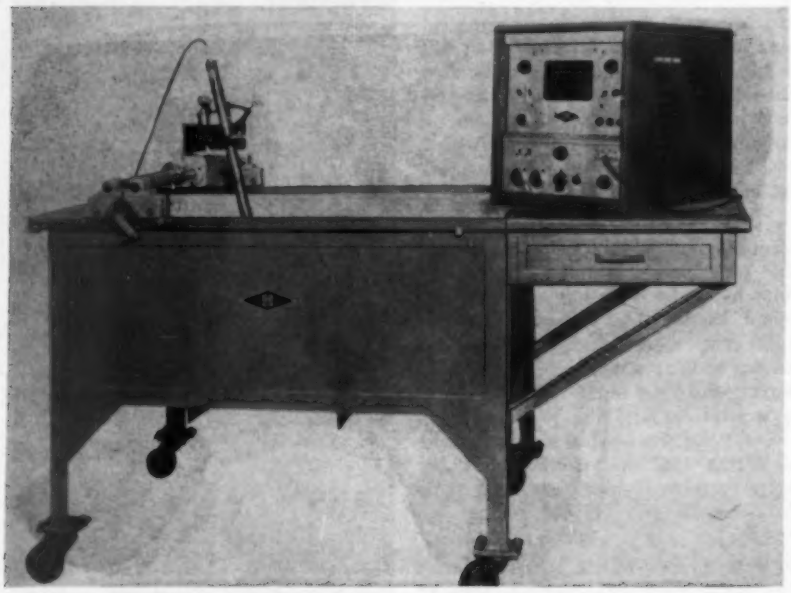
New Products and Processes

ULTRASONIC TEST UNIT



A packaged test unit for ultrasonic, non-destructive metal testing has been developed by the **Curtiss-Wright Corp.'s** Industrial and Scientific Products Division.

Called the Immerscope, Model PT1001, the unit is designed for stabilizing quality control standards and reducing inspection costs. It consists of the Immerscope itself, a 4-ft. immersion tank, search tube and rack, precision manual manipulator, longitudinal and transverse manual scanning mechanism and a complement of crystals.

Metal parts to be inspected are placed in the partly water-filled tank. Ultrasound, transmitted by the search tube and crystal, penetrates the metal parts and reflects when a defect is encountered.

The reflections or echos, are visually recorded as "pips" on the Immerscope screen. Exact position of the defect can then be determined by using the manual manipulator.

Analysis of various fabrication techniques is also possible with the Immerscope.

Circle No. 159 on Reader Service Card.

BLIND FASTENER

Huck Manufacturing Co. is producing a blind-application fastener of heat-treated alloy steel of pin-and-sleeve design. Positive mechanical lock is provided by a one-piece steel collar that is driven into a locking groove on the pin at the point of maximum tension.

Trade-named the Tau Bolt, the fastener is said to offer unusual pull-together qualities and a wide grip variable in each grip size. Present production is limited to ¼"-diameter size.

Circle No. 176 on Reader Service Card.

Circle No. 13 on Reader Service Card.

FORCE GAUGES

Republic Aviation Corp. reports that it has solved the problem of accurate measurement of the artificial forces that must be built into boosted aircraft control systems to simulate air load on control surfaces. It is now using two standard, direct reading force gauges manufactured by the **Hunter Spring Co.**, approved by USAF.

Model L-30 (illustrated), capable of measuring forces to 30 lbs. with an accuracy of ±.3 lb., is used to determine magnitude of forces that simulate the effect of air load transmitted to the control column from elevators and ailerons.

Model D-100A indicator, capable of measuring forces to 100 lbs. with an accuracy of ± 1 lb., measures simulated air load feed-back on rudder pedals.

Republic says the direct reading force gauges are not only far more accurate than the erratic "fish-scales" formerly used to perform these tests, but are also vastly simpler to operate. They can measure forces in compression as well as in tension.

This eliminates the cumbersome cable and pulley linkages required to make compression readings on rudder pedal with ordinary tension-type spring scales.

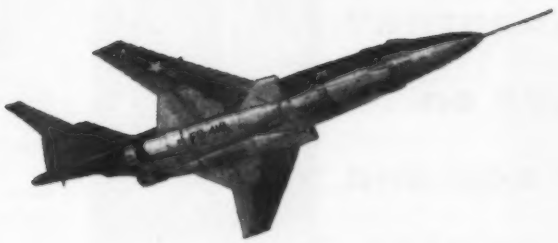
Circle No. 151 on Reader Service Card.

TV CAMERA & HOUSING

A "ruggedized" TV camera and acoustical housing developed by **Kay Lab** are said to be ideally suited for rocket and jet engine test facilities, rocket launching sites and similar applications where noise prohibits the use of ordinary equipment.

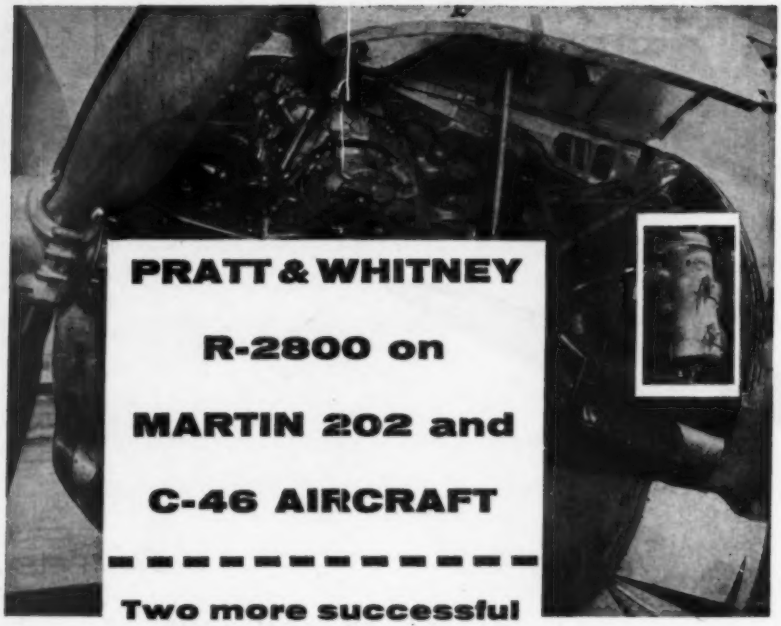
Before these instruments were designed, the company says, industrial television cameras could not operate properly under high ambient noise conditions.

The acoustical housing provides approximately 45 db of isolation and will accept the remote iris-focus, autozoom lens and three-lens turret accessories for the camera. A heavy duty pan-tilt is also available for the acous-



McDonnell's two top "Voodoo" fighters fly with Honeywell Autopilots. The classified F-101B (sister ship to the F-101A shown) has the new Honeywell MB-5 Autopilot, which does more for the pilot than any other flight control system ever designed. A primary feature of this autopilot is a universal coupler for automatic ground control intercept, for instrument landing, and fire control. The MB-5 is another example of Honeywell Aero leadership in high performance control systems.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL



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tical housing.

The equipment has been used to observe rocket engine tests in which previously measured sound levels at the site were well over 150 lbs., considerably more than the threshold of pain for human beings.

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FLIGHT RAMP

A passenger loading ramp suitable for twin-engine and four-engine aircraft is offered by **Texas Metal and Manufacturing Co.** Pan American World Airways and Mohawk Airlines have purchased a number of the ramps.

Trade-named the Tex-Met Flyte-Ramp, the unit was designed for a platform height varying from 93 to 115 inches. Shipped in several packages, it weighs 850 lbs. and is priced at $1,800, f.o.b. Dallas. Made of aluminum alloy, it is lightweight, easy to assemble.

Circle No. 157 on Reader Service Card.

CHECK VALVES

Newly established **Tactair Valve Division of Aircraft Products Co.** has introduced a series of rotary-type controllable check valves for 3,000-psi service.

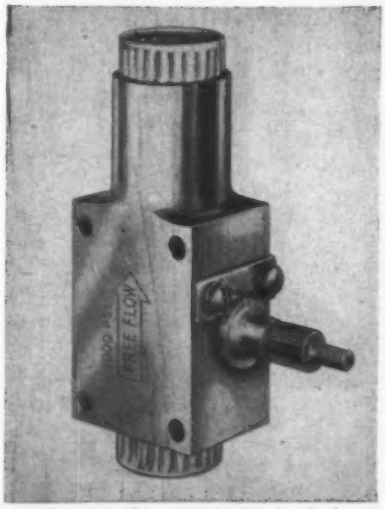
Designated Tactair Series 5900, these valves conform to MS-28880 and are said to exceed requirements of MIL-V-5528. They may also be used as all-purpose shut-offs for lighter applications in fuel and oil systems.

In addition, the manufacturer says,

they may be employed for zero-leakage sequence operation in applications that require a simple, dependable valve with full-flow, by-pass return.

Internal parts are of stainless steel in an aluminum alloy housing. Standard units are designed to handle liquids within temperatures ranging from —65° to 160°F. Special units are available for wider temperature ranges.

Three styles are available: Model 5920, which has a ¼" OD tubing, weight of .37 lb. and a handle torque of 45 in.-lb. max.; Model 5922, ½" tubing, weight .46 lb. and a handle torque of 75 in.-lb. max., and Model 5924, ¾" tubing, weight of .87 lb. and handle torque of 90 in.-lb. Literature is available.



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LUBE PUMP

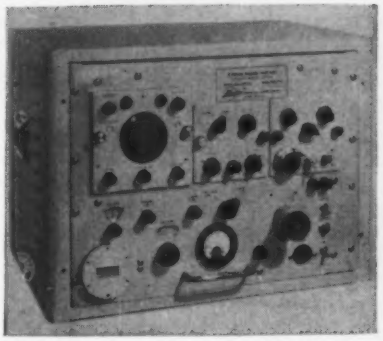
Lear Inc.'s Lear-Romec Division is producing a three-element lube and scavenge pump for gas turbine engine oil, built for fluid and ambient temperatures ranging from —65° to 350°F using gas turbine oil MIL-L-7808.

Capacity of the two scavenge elements is 5 gpm at 4,200 rpm, 5 psi discharge pressure, and the lube element 2 gpm, 60 psi discharge pressure. Rated capacity is based upon pumping oil at 350°F.

Design principle utilizes bore that provides smooth, non-pulsating flow in rotary sliding blade, positive displacement, self-priming pump. Weight is 2.5 lbs. Literature available.

Circle No. 158 on Reader Service Card.

RADAR TEST SET



Western Division of **Kearfott Co., Inc.** is in production on a radar test set that provides all necessary instrumentation for complete check-out of radar and other microwave transmitters and receivers. Illustrated is test set for C-band radar. Similar set for X-band is to follow.

Typical function checks include: transmitter power output; pulse spectrum display; frequency measurement; bandwidth analysis; receiver gain measurement. Check indicator with simulated echo provides signal for standing wave measurement.

The set's modular construction with plug-in type subchassis make for extra convenience for maintenance and diversified application. The test set weighs approximately 70 lbs. and will operate on the airplane's electrical system.

Circle No. 179 on Reader Service Card.

Product Briefs

• **Emerson & Cuming, Inc.** has developed an epoxy casting resin, designated Stycast 2741, that retains its flexibility at —70°F and is therefore suitable for encapsulating, potting and sealing applications requiring low temperature use. Shrinkage during cure is said to be negligible.

Circle No. 164 on Reader Service Card.

• **Tracer Control Co.,** in conjunction with **Pegasus Laboratories,** has developed a new line of electronic-hydraulic tracer control machines, designated as the E-Series Duplimatics. Tracing at speeds required by the airframe industry is within the scope of this equipment.

Circle No. 170 on Reader Service Card.

• **Resin Industries,** a subsidiary of The Borden Co., has introduced a vinyl electrical insulation sleeving to meet Spec. MIL-I-631C. Designed Resinite Hi-Heat 105A, the material provides a working temperature range from —21°C to 105°C and a dielectric strength of 1,000 volts/mil average. It is said to be resistant to fungus, flame, oil and cut-through.

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PAT. PENDING

West Coast Talk . . . By Fred S. Hunter

• Navy may take new look at transport version of Douglas A3D. It's about time, too.

WE'VE HEARD a whisper or two lately that the Navy may take another look in the direction of a personnel transport version (12 or 14 passengers) of the Douglas A3D attack bomber. Couple of years ago, Douglas put together a mockup of this interesting development to show to the Navy, but got nary a tumble. At that time, the services had little interest in jets for transport purposes; just combat. At last, the pendulum begins to swing over.

Hunter

The Air Force recently invited manufacturers to submit proposals for twin-jet and four-jet utility transport planes, and now the Navy shows signs of getting into the act. High time for both, say we. This is the jet age. You don't get jet age efficiency flying admirals in R4Ds, or colonels in C-45s.

• • •

Hamilton Standard has developed a spinner for the DC-6B, which will be available for delivery next year, and Douglas has designed a cowl inner liner to supplement it. This reflects successful application of the spinner on the DC-7s. Big asset of the spinner is its contribution to better engine cooling, making it possible to fly with cowl flaps tighter. Since cowl flaps produce drag, more speed is netted. Spinners also keep propellers warm and prevent oil in the dome from congealing. They're also better-looking, make an airplane appear smarter, and don't let anybody tell you this isn't important, too.

• • •

Architecture of Honolulu airport's new passenger terminal building will make use of double-sloped Polynesian roof lines with deep jutting, sheltering eaves. Some walls will be lined with lava rock. Interiors will feature a Hawaiian motif. "When passengers get off the plane and walk into the buildings, I want them to know they are in Hawaii, and nowhere else," says Architect Theodore A. Vierra. But you can't get away from the 20th Century even in Hawaii. The seven-story administration building—ah, that will be modern.

Riverside County has completed a passenger terminal building at Blythe for use by Bonanza Airlines. Cost—$10,000 or $12,000. "Without federal aid," boasts Joe Marriott, retired CAA 4th Region administrator who is now director of airports for Riverside County.

• • •

Lone civilian to be graduated in the last class at the USAF Experimental Test Pilot School at Edwards AFB was Donald C. Anderson, a Convair test pilot. He got his sheepskin along with seven Air Force captains. The new class, now in session, has two civilians, Thomas W. Gillespie, Jr. of Beech and Martin J. Signorelli, Jr. of Republic. They're taking the six-months course with two Air Force majors and 12 captains. . . . Maj. Gen. Kenneth P. Berquist, director of operations, USAF, recently came out to Edwards and checked out in three of the 100 series—the F-100, F-102 and XF-104.

• • •

Boeing is in with its application for a CAA type certificate for the Model 707-400 series jet transport. This is an intercontinental version similar to the dash 300 series, except for installation of Rolls Royce Conway by-pass engines instead of P&W J75s . . . Lockheed is due to get a Rolls Royce RB-109 in 1957 for test in No. 1961 . . . Convair has on order a milling machine that will carve a machined part out of metal entirely by electronic direction and without a model.

• • •

Bill Jack Scientific Instrument Co.'s nickname for its universal camera control system which can operate 15 cameras at once from a plane flying up to 1,687 mph, is "Yewkus" . . . American Society of Planning officials has scheduled a session for discussion of airports and heliports at its 22nd annual National Planning Conference to be held in San Francisco March 17-21. Pastushin Aviation, now making dive brakes for Douglas A4Ds, is laying plans to go after more subcontracting business.

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Piper Unveils '57 Apache, Tri-Pacer, and Super Cub

Piper Aircraft Co. unveiled its 1957 models at its annual distributor meeting in Lock Haven, Pa., and revealed that the Piper Comanche, new all-metal, high-performance single-engine aircraft, would be included in the line with details to be announced later.

The improved 1957 models are:

• **Piper Apache,** twin-engine executive aircraft, offered in four- or five-place configurations with option of two airline-type fully-reclining seats. New engineering features include higher capacity carburetor heaters plus installation of carburetor air temperature gauges as standard equipment.

To improve visual setting of throttles, prop and mixture controls, the throttle quadrant has graduated scales between raceways with numbers one to five.

The Apache is powered by two 150-hp Lycoming engines driving Hartzell full-feathering, constant speed propellers. It cruises at 170 mph at 75% power at 6,000 feet. Fuel capacity of the standard and custom models is 72 gallons with a four-to-five-hour range. For the "super custom" model, fuel capacity is 108 gallons, range up to 1,200 miles.

The company reports that more than 700 Apaches have been delivered since the aircraft was introduced more than two years ago. Production schedule is two planes per day.

• **Piper Tri-Pacer,** also powered by 150-hp Lycoming engine, includes tricycle gear with Hydrasorb shock absorbers and simplified controls for coordinated turns with wheel or rudder pedals alone, accomplished with interconnected springs linking rudder and aileron controls.

Most prominent exterior change is installation of a "running board" on right landing gear leg that facilitates entry and exit from front cabin door.

The 1957 Tri-Pacer cruises at 132 mph and has a range of 500 miles with standard 36-gallon capacity. Range can be increased to 600 miles with optional eight-gallon auxiliary tank under the rear seat.

• **Piper Super Cub** is offered in two versions. The Model 95 is powered with a 90-hp Continental engine and the Model 150 with the Lycoming 150-hp powerplant. The latter model, equipped with flaps, reportedly can take off and land in less than 50 yards. The agricultural version, PA-18-A, is equipped with a hopper with 110-gallon capacity for liquid or 18 cu.-ft. of dust.

1957 Piper Apache is offered with three optional seating configurations.

1957 Piper Tri-Pacer features simplified controls for coordinated turns.

Agricultural version of 1957 Piper Super Cub features sprayer, duster or combination unit.

Apache instrumentation in custom and "super custom" models provides ADF, VOR, ILS localizer, 75-mc marker beacon.

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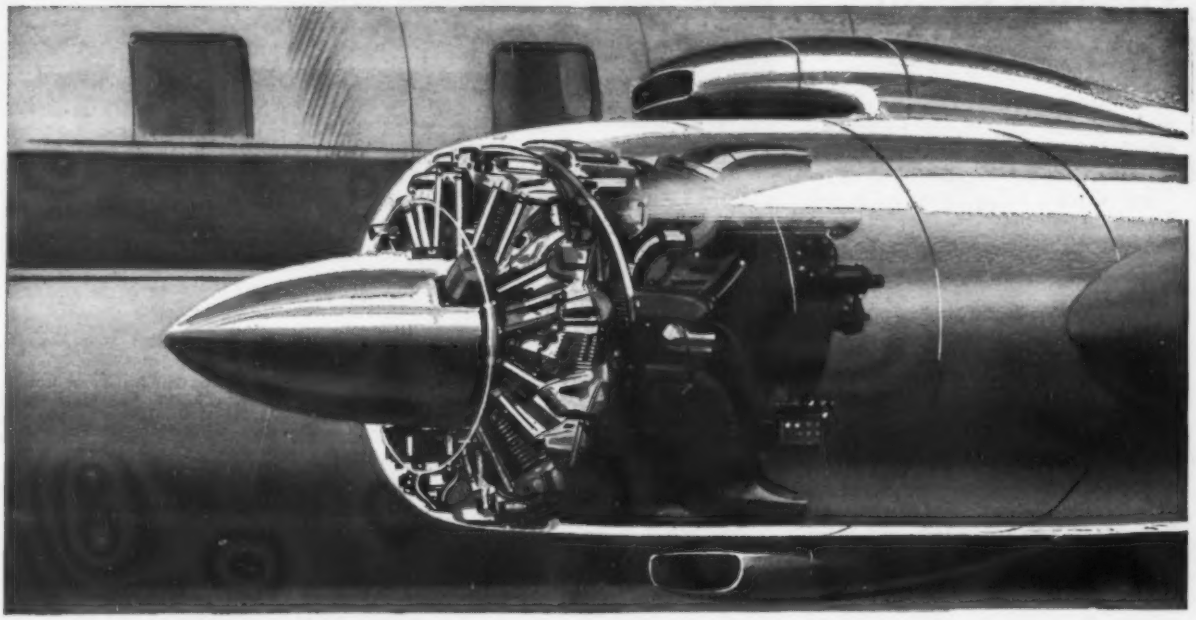

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Conference Urges Program to Cut Flying Hazards

A four-area program to help eliminate hazards of private flying was revealed by Jerome Lederer, director of The Cornell-Guggenheim Aviation Safety Center, following a major conference in Wichita, attended by representatives of the private flying industry, government agencies and universities.

Four critical areas and recommended action are:

• **Need for better flight instruction.** The conference urged that "a greatly augmented instructional program be undertaken to train not only the private pleasure flyer, but his instructor." It was agreed that the "quality of flyers was almost solely dependent upon the quality of instructors." It was suggested that better qualified men would be attracted if the rates were increased from the present pay scale of about $3.00 per hour.

Cited as necessities for private flying were installation of basic navigational and weather instruments and adequate training in their use. It was noted that many facilities for instrument training are available to the private plane buyer through his dealer and local flying groups, but the facilities are not being fully used.

• **Inadequacies of low-level weather reporting.** Limited Weather Bureau funds were seen as the main contributing factor but it was emphasized that the lack of the weather information "constitutes a continually hazardous condition to the private pilot."

It was recommended that a number of new weather observation and reporting stations be built for full-time service in a reporting program that would encourage the private flyer to report frequently weather and flying conditions encountered in flight. The Cornell-Guggenheim Safety Center has launched a campaign to implement the in-flight reporting program in cooperation with the National Association of State Aviation Officials and the Aircraft Owners and Pilots Association.

Latest utility aircraft to take to floats are the Taylorcraft Seabird (above), float-equipped version of Taylorcraft's fiber glass four-passenger design, and the Helio Courier (below), being tested with Edo 249-2870 floats in a plane belonging to Helin Tackle Co. of Detroit. Seabird is powered by a 225-hp engine and cruises at 130 mph with approved gross weight of 3,040. Performance of Helio float-equipped Courier indicates cruise of 139 mph, about 14 miles slower than the land-based version. Takeoff run with a 3,000-lb. load is reported at 300 ft., with indicated airspeed at takeoff at 15-30 mph.

• **More adequate accident analysis.** Current methods of analysis were criticized as "non-uniform." With the Conference calling for a review of reporting procedures of analytical efforts, Lederer revealed that the center already has begun a study of the problem.

• **Need for safer small aircraft.** While the conference was told that safer aircraft are continuously under development, specific developments were called for in providing greater inherent spiral stability and stall-resistant characteristics in lightplanes. Strongly urged was the accelerated development of low-cost devices to ensure spiral stability.

Civil Aeronautical Administration reported a decline in lightplane accidents in 1955 from 1954 for all of general aviation, in its statistical analysis. Number of accidents dropped from 3,035 in 1954 to 2,948 in 1955, fatal accidents declining from 341 to 318 and fatalities from 610 to 544. While the decline was

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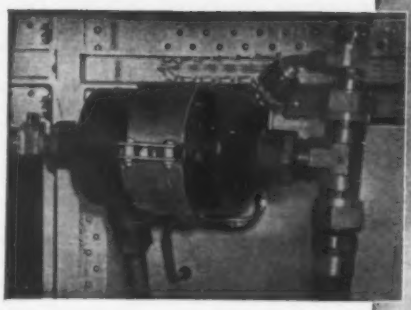

Point of no Return

When a USAF TM-61 Martin Matador leaps from its launcher, it has passed its point of no return. Its mission calls for a one-way trip to the target. The Matador must function perfectly if its mission is to be accomplished. There is no turning back for repairs.

Fuel flow plays a vital part in sending the Matador to its objective. At the speed it travels even a momentary interruption could cause serious deviation in flight characteristics. Martin needed a filter to remove foreign material from the fuel. A filter that would function perfectly, yet be expendable, light in weight, resistant to corrosion. The filter had to have a minimum shelf life of two years. They came to Purolator for a special design.

The Purolator filter designed for use in the Matador filters down to 5-10 microns at a flow rate of 18 GPM. It can be connected directly to auxiliary fuel tanks outside the missile so that fuel on board is not consumed during pre-flight calibration operations. Its construction is resistant to corrosion, has the required shelf life, yet it is lightweight and expendable. A perfect example of Purolator's ability to engineer and manufacture filters for special needs . . . no matter how stringent the requirements are.

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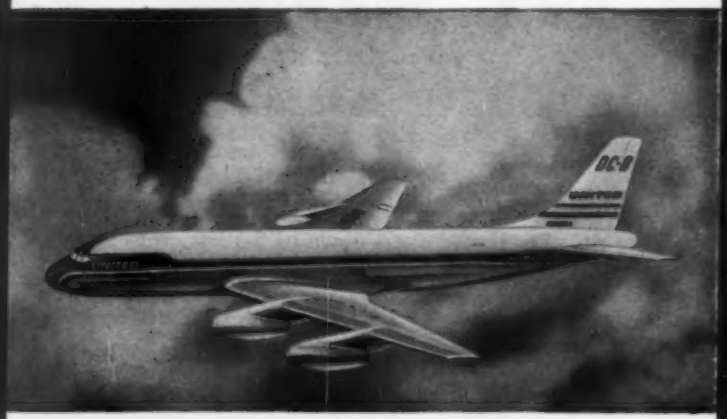

THE DOUGLAS DC-8, powered by four P&W J-57 engines, will carry 112-140 passengers and 7000 lbs. of freight over 3000 miles non-stop at speeds up to 575 m.p.h. Seat-mile costs of operating these jets may even be less than latest piston types.

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spread through most of general aviation, there was a slight increase in noncommercial operations, including business flying.

CAA found the "most spectacular" improvement in instructional flying, where accidents dropped from 648 to 610, fatalities from 89 to 52. CAA credited its instructional safety campaign with the improvement whereby the competency of the instructor is investigated when a student accident occurs. CAA safety agents, in some instances, provided additional training but in other cases instructors either voluntarily surrendered their ratings or did so after proceedings were initiated by CAA.

Despite this report, however, the Conference found that the pleasure flyer averages nearly one fatal accident for every million miles flown compared with one fatal accident per 15 million miles flown for business flying and one for every 200 million miles flown by the airlines.

Attending the conference were representatives of AOPA, University of Illinois Institute of Aviation, National Aviation Trades Association, National Business Aircraft Association, Cessna Aircraft Corp., Aero Design & Engineering Co., CAA, CAB, Aviation Crash Injury Research, Texas A&M, Guggenheim Foundation, NASAO, National Advisory Committee for Aeronautics, U.S. Navy, U.S. Air Force, National Pilots Association, University of Wichita, Aircraft Industries Association and Beech Aircraft Corp.

Business Flying Briefs

• **First flight** of the Transland AG-2 agricultural airplane was successfully completed recently. CAA Part II certification tests are expected to be completed by the end of the year. The first flight, which lasted 55 minutes, featured a takeoff in under 400 feet with a gross weight of 4,033 lbs., climbing at 2,500 ft. at the rate of 1,400 ft./min.

• New landing light installation for the Piper Apache has been engineered by Dallas Aero Service. CAA approved, it has 100-watt lights recessed in the leading edge of each wing which focus for 300-400 feet or more from the plane. Installation weighs 3½ lbs.

• Luxury-equipped Aero Commander was delivered to Vietnam for personal and official use of President Ngo Dinh Diem. Air Carrier Service Corp., Aero Commander distributor in the Far East, negotiated the sale, its eighth in the area. After formal presentation ceremonies at Washington National Airport to the Vietnamese ambassador, the Model 560 A was ferried to Saigon by pilots of California Eastern Aviation, ACS subsidiary, over the North Atlantic, Europe, Middle East and India.

People

MANUFACTURING

Lawrence G. Haggerty elected president of Farnsworth Electronics Co.; **Arthur N. Corner** appointed project mgr. missile test equipment; **Capt. Upton S. Brady, Jr.,** (USN, ret.) named project mgr. missile guidance equipment.

HAGGERTY

Thomas A. Nelson appointed director of sales for Boeing Airplane Co. at Wichita.

Al Nadeau named chief sales engineer of Gladden Aircraft Products Corp.

George A. Clark joined the staff of Dallas Airmotive as service mgr.

Robert M. DeHaven appointed associate director of aircraft operations and flight test at Hughes Aircraft Co.

DeHAVEN

Roland C. Bergh is director of Republic Aviation Corp.'s jet noise suppression program; **Robert L. Bertner** named chief engineer for administration.

George Friedl, Jr. joins Litton Industries as vp.

John A. Vaughan appointed mgr. engineering of the New York Air Brake Co.'s Watertown Div.

George G. Gauck appointed vp-sales for Zero Mfg. Co.

Archie N. Colby appointed gen. sales mgr. of Greer Hydraulics, Inc.; **Baboo Ram (Bob) Teree** named chief engineer; **John Farley,** director of new marketing department; **Robert E. Williams** appointed operational mgr. of Greer Industries, Inc.

AIRLINE

Robert L. Brunner named mgr. of rates and tariffs for The Flying Tiger Line; **Ralph Stump** named asst. secy.-treas.; **Manny Marquez** succeeds Stump as controller.

Milton Zohn appointed claims mgr. and **Don Gammon** named system chief agent for Riddle Airlines.

Frank B. Smith promoted to div. cargo analyst for Pan American World Airways' Latin American Div.

Mason Mallory appointed sales promotion mgr. for Western Air Lines.

Mrs. Ester McConnell named mgr. of tours and cruises of Transocean Air Lines.

John E. Stephen is new general counsel for Air Transport Assn.; **Clifton J. Stratton, Jr.** appointed asst. gen. counsel. **Robert H. Curtis,** Continental Air Lines, elected chairman of ATA meteorology committee for 1957.

Peter L. Rothholz named tour mgr. for KLM Royal Dutch Airlines in the U.S.; **Felix von Balluseck,** deputy president and head of traffic and sales directorate, will retire Dec. 31; **J. van der Ploeg,** head of the finance and accounts directorate, will succeed him.

Byron F. Sherrill appointed asst. to Trans World Airlines' board chairman; **Walter D. Sherwood** and **Edward A. Carroll** named mgr. of power plant research and mgr. of aircraft performance, respectively, of TWA's engineering staff in Kansas City.

HONORS

Theodore (Ted) I. Renshaw, special representative in plant engineering for Lockheed Aircraft Corp., Marietta, Ga., elected president of The National Management Asst., succeeding **Gordon R. Parkinson** of Trans World Airlines.

Air Commodore Frank Whittle, English aeronautical engineer, received Franklin Medal for his pioneer work in jet engines and high-speed flight.

Distinguished Service Medals were awarded by the National Advisory Committee for Aeronautics to **John W. Moise** and **Charles W. Littleton** "for outstanding bravery beyond the call of duty" following a high-altitude explosion in the rocket-propelled X-1A. They were crew members of the B-29 "mother" airplane which was carrying research plane.

Donald W. Douglas received the National Defense Transportation Assn. award as the person who made the most outstanding contribution to military transportation in the past year.

Dr. William F. Ballhaus, chief engineer of Northrop Aircraft, elected chairman of the Aircraft Industries Assn.'s Guided Missle Committee.

Justus T. Vollbrecht, president of Energy Control Corp., elected national president of the Instrument Society of America.

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Donald J. Davis, Douglas Aircraft Co. Director, Western Pressed Metals Div., Santa Monica, Calif.

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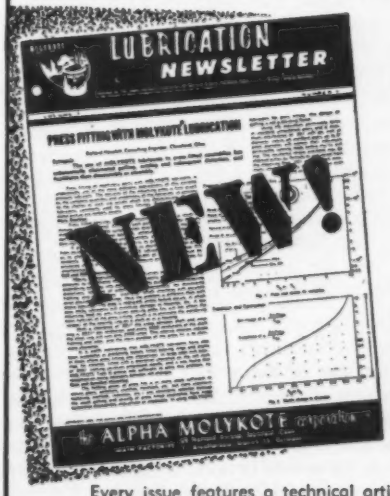

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Circle No. 18 on Reader Service Card.

International Aviation

By Anthony Vandyk

Because the airlines have failed to spell out their requirements to manufacturers for jet transports they are having to take what is being offered—an adapted or converted tanker. This was one of a series of frank statements made by I. A. Aler, President of KLM Royal Dutch Airlines, at the recent European Aeronautical Congress in The Hague.

Aler believes that for the jet age the airlines need an aircraft with better takeoff and landing performance than those now being offered (Nonetheless, KLM is "Keeping up with the Joneses" by buying eight DC-8s). The requirement is for 575-mph transport capable of operating economically at half today's fares, Aler considers.

KLM's president feels that it is imperative that the jet transport incorporate a much higher degree of reliability than its present piston-engine counterpart. He suggests that contracts with manufacturers might have to include the guarantee for hotel space along the routes: "I hate to think of the problems of accommodating passengers when two 120-seat aircraft are delayed for technical reasons," he commented.

Furthermore, Aler-points out, time lost due to ground delays will assume greater importance in the jet age when time in the air will be so much less than at present. The cost of keeping substantial number of spare engines, worth $250,000 apiece, available along the routes, combined with the costs resulting from technical delays, will make it imperative that the jets have a much greater degree of reliability than present-day aircraft.

Aler is concerned that only about half of present powerplants sold with an approved overhaul life of 1,000 to 1,400 hours ever reach such figures. He believes that in their striving for ever higher performance manufacturers make the operators pay for the better performance with technical delays and excessive maintenance.

The KLM executive considers that the airlines are doing part of the work that should be performed by the designer and manufacturer. Too many major modifications, requiring the grounding of aircraft for several weeks, are found to be necessary within three months of delivery. Furthermore, he notes that every modification entails increased weight. Aler speaks as an authority, since KLM was one of the first European operators of such types as the DC-2, DC-3, DC-4, DC-6, Constellation, Super Constellation, and Convair-Liner. The Dutch airline has DC-7Cs, Viscounts, Electras and DC-8s on order.

First of BOAC's Nine DC-7Cs

BOAC has received its first Douglas DC-7C. It will get six more by year-end and last three by April 1957. New equipment will be introduced on London-New York route in January and will be used to extend service to San Francisco next April.

New Latin Carrier Plans Service in '57

Argentina's new private enterprise airline, Transcontinental, has concluded a lease purchase arrangement with California Eastern Aviation, Inc., which is supplying five Lockheed L-1049H Super Constellations valued at about $12 million and having a seating capacity of 82 each. The aircraft will become the full property of Transcontinental in five years.

California Eastern will have a 25% capital participation in the new Argentina company and will be in full charge of the technical side of the operation, with aircraft servicing to be carried out in the United States. American flight crews will be used at the beginning.

The training of Argentine flight crews is scheduled to start in 1959 and to be completed by 1962, by which time 100% Argentine crews will be used. Simultaneously, arrangements will be made for the gradual shifting to Argentina of maintenance operations.

• **Transcontinental plans** to start in July 1957 between Buenos Aires, Sao Paulo, Rio de Janeiro, Caracas and New York, using three Super H Constellations that will be delivered by California Eastern next May.

Next step is planned for the end of 1957, when Transcontinental will have an option for two more Super Constellations. The intention is to start services between Buenos Aires, Sao Paulo, Lima, Mexico and San Francisco or, alternately, an intensification of services to New York.

On the basis of fares slightly below IATA tourist levels, and starting off at 40 passengers per flight, increasing by three passengers per flight per month, Transcontinental estimates that it will show operating losses in 1957 and 1958 but should start making a profit toward the end of 1959.

Apart from its plans for long-distance international services, Transcontinental intends to inaugurate domestic services in Argentina early in 1957, as soon as a concession is granted by the Argentine authorities. The Company hopes to serve a route between Buenos Aires and Rosario with Curtiss C-46 Commuter aircraft with capacity for 50 passengers, and to expand services to other parts of the country such as Mendoza, Bariloche, Santa Fe, Resistencia and Tucuman.

Transcontinental will start with a fleet of four twin-engine Commuters, with an option for two more. It also has under consideration the purchase of Convair 440s.

MANUFACTURING BRIEFS

Air Fouga is the name of a new company established to take over the aviation activities of Fouga. Breguet, Dassault, Morane-Saulnier, Sud-Est Aviation and Ouest Aviation have equal shareholdings in the new firm . . . **Hindustan Aircraft Ltd.** is to build the Folland Gnat lightweight fighter under license in India. Folland will supply 25 Gnats from England for delivery starting next April. The Gnat's Orpheus powerplant may also be built in India under an agreement signed between the Indian government and **Bristol Aero-Engines** providing techical assistance and license rights . . . Germany's **Weser** company has signed an agreement with Vertol for the overhaul and maintenance of H-21 helicopters. West German probably will buy 26 H-21s.

Canadair has a jet trainer project which it is planning to sell to the RCAF. Powerplant would be an Armstrong-Siddeley Viper . . . **France's SNCA du Sud-Est (SNCASE)** is now known as **Sud-Est Aviation.**

TRANSPORT TRENDS

Washington, D. C., Nov. 5, 1956

CAB'S NEW YORK-FLORIDA CASE, most controversial of recent major route proceedings, continues to produce extraordinary developments although decision was issued last month (see page 21). Unsuccessful parties in original decision have renewed hope as time for reconsideration by CAB draws near. They're buoyed by possible effect of major investigations of the decision, also by apparent initial equipment difficulties of Northeast Airlines. NEA insists it will be equipped for Florida market in December. And it has again told CAB that the company's not for sale.

●

AIRFREIGHT BUSINESS of domestic trunklines has picked up in last two months, but year's volume won't approach early predictions. When final figures are in for first nine months, ton-mile increase will probably be 5% to 10% over same 1955 period. All-cargo carriers' gains are running considerably ahead of trunks.

●

WHEN AIRLINES GET JETS, they'll reach a speed plateau which may be expected to remain constant for at least 10 years. This will be the first such development in history. So says A. E. Raymond, Douglas Aircraft's vice-president-engineering. Further increases in speed are economically unjustified because they run into the drag rise associated with the speed of sound.

Significance is that carriers' assets are protected against the greatest factor of technical obsolescence. Gains can be consolidated. Also significant is Raymond's statement that Douglas looks "forward to the opportunity to realign our own products in such a way that the advantages we are helping to give the trunklines may be made available to the large remaining elements of the air transport industry."

●

STATUS OF NON-SCHEDULED AIRLINES will be uncertain for next few months at least. Their designation by CAB as "supplemental carriers" and the 10-flights-a-month authorization didn't withstand court challenge of scheduled airlines and railroads. But CAB needs time to reassess the situation. No change in carriers' status is expected until Board decides how to carry out court's reversal.

CAB has decided not to appeal to the Supreme Court. This indicates for the first time that it accepts the July reversal by Court of Appeals. But non-sked intervenors—Aircoach Transport Association and Independent Military Air Transport Association—may seek Supreme Court action on their own.

●

BOAC AND DE HAVILLAND ARE DISCUSSING technical details of a new jet transport design, the D.H. 118, to be powered by four Rolls-Royce Conways. It will bear no resemblance to the Comet. BOAC has asked for a plane "sufficiently flexible to meet our worldwide requirements and ready to enter passenger service in 1962."

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Airlines Tackle Jet Ground Handling Problems

Carriers putting pressure on manufacturers to design needed equipment, but aren't sure what they want; four concepts being studied.

By ERIC BRAMLEY

MIAMI BEACH—The airlines are currently engaged in a "big push" to get the answers to the ground-handling problems they'll encounter with their forthcoming jet and turboprop transports.

And the pressure is on the manufacturers of ground-handling equipment to come up with some hardware and to sell the airlines on using it.

Within six months, the carriers want to hold what could amount to a "design competition" on ground equipment. They want to see a demonstration of the present concepts of the equipment manufacturers for towing heavy jet transports, for furnishing ground power requirements for air-conditioning, engine starting, etc.

This means that equipment makers will have to decide on their designs and invest hundreds of thousands of dollars in construction of prototypes.

Equipment Predicament

The manufacturers' predicament is this: they're not sure what type of equipment the airlines want. On the other hand, the airlines feel they can't make a choice until they see some equipment demonstrated—and in most cases it's equipment that hasn't been built yet.

It was evident at the meeting here of the Air Transport Association's ground equipment and maintenance facilities subcommittees that some of the airlines have already decided tentatively how to handle their jets on the ground. But equipment developments might change these ideas.

• **The carriers' aim** is to improve ground-handling over today's standards. "It's one thing if we're trying to meet today's standards of ramp time and comfort," said Marvin Whitlock, American Airlines' vice president-operational planning. "The challenge is to improve, not just meet. Great progress has been made in flight service. . . . Reservations handling has improved.

"But take a real candid look at ground handling and maintenance. There's not as much progress. Those of you in ground facilities departments are facing the greatest opportunity of your careers. The operator with the most efficient ground handling and maintenance will be the leader."

• **It was revealed** at the meeting that at least two carriers—United and Pan American—believe it will be feasible to taxi jets to gate positions for loading and unloading. There will be problems, of course, but they are not believed to be insurmountable. Precautions that must be taken include:

• Blast fences must be used between all gate positions.

• Ramp personnel must have protective equipment—ear plugs and helmets.

• Passenger staging areas must be completely closed.

• There must be better communications between ramp personnel and pilots.

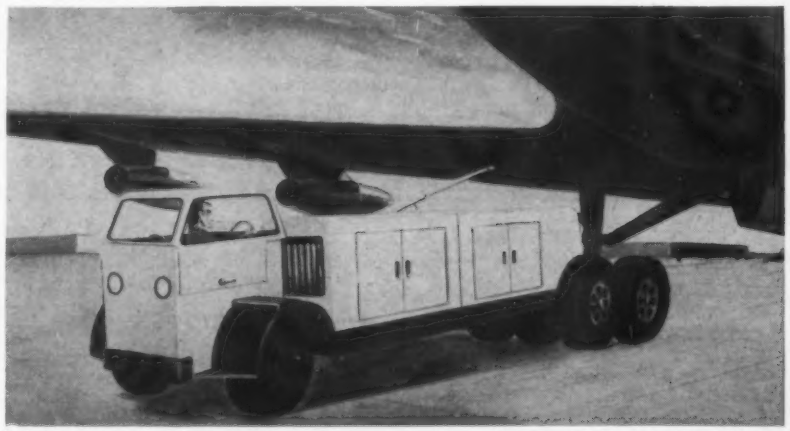
• Ramps must be kept clean. Foreign material entering a jet engine can mean expensive overhaul.

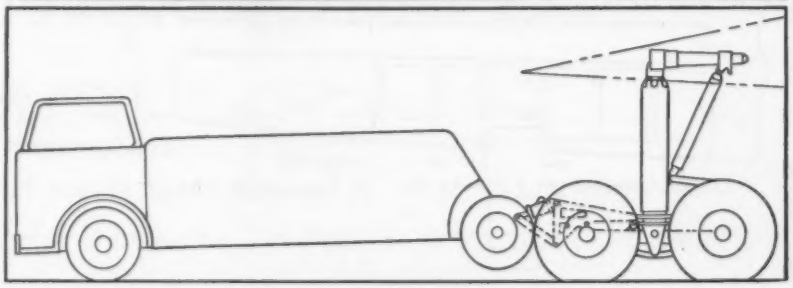
Blast velocity is considered a definite problem. For this reason, blast fences will be a necessity. It was also agreed at the meeting that compressor whine will be a "definite and serious ramp and loading area problem." Aircraft manufacturers are being asked for a solution. Boeing is studying compressor noise and expects to have some answers within six months.

There is some feeling that engine fumes at the ramp will also be a problem. If passenger staging areas near the ramp are to be air-conditioned, air inlets may have to be remoted to prevent entry of fumes. The same goes for inlets to airport restaurants.

In taxiing to and from the ramp, it is unlikely that the pilot will be able to see the tips of the jet's swept-back wings. Thus, closer cooperation between crews and ramp personnel will be necessary. And airline medical departments are expected to delve deeply into the question of protective devices for ramp personnel.

• **United Air Lines** and Douglas





Air Logistics Corp.'s ground power and moving vehicle is shown in above illustrations. It hooks to rear of main gear, uses friction-drive principle. Driver can drive vehicle in either direction by swinging his seat around 180 degrees.

Aircraft Co. recently ran taxi tests at San Francisco International Airport, using a Douglas A3D fighter-bomber powered by two P&W J57 engines. During the tests, UAL experimented with 4-ft., 6-ft. and 10-ft. blast fences, set at an angle of 60 degrees from the ground. With a 6-ft. fence, blast had no effect on adjacent planes or people servicing them. A 4-ft. fence was also found to be effective.

'Ingestion' or Indigestion

One problem due for considerable study is "ground ingestion"—engines picking up foreign material. Air Force and Navy have incurred millions of dollars of expense from premature engine removals due to debris entering the scoops—nuts, bolts, tools, stones, etc. The problem, at least for commercial operations, is considered to be much more serious at the ramp than on taxiways or runways.

The answer, obviously, is clean ramps. But as one observer put it: "No amount of cleaning is going to prevent a woman from dropping a piece of costume jewelry, which can be blown to another gate position. And what about the metal guards that keep coming off the bottoms of passengers' bags?"

On another phase of ground handling, F. A. Clark, UAL's superintendent of ground equipment, hit at present baggage handling methods. "Some method other than the 'bucket brigade' type of operation must be developed for loading these cargo pits," he said.

Therefore, UAL has decided to use pre-loaded containers to handle baggage on its DC-8s. Cost of containers,

Self-propelled passenger loading ramp was built for United Air Lines by Service Metal Fabricators Co. Ramp is driven by a 24-volt DC motor through a gear box, with a control handle (seen on left at foot of stairs) to steer with, using forward and reverse buttons.

spares and other equipment for UAL's fleet of 30 DC-8s will equal the price of one DC-8.

Eleven containers, each 60 cu. ft. and holding 1,100 lbs., will be used on each plane, according to Dale Medland, UAL's superintendent of ramp services. Five will be loaded in the forward baggage compartment and six aft (see illustration). Containers will be loaded at the terminal, transported to the plane and mechanically lifted into the compartments. On terminating flights, they will be unloaded at the terminal. UAL's weight loss through use of containers will be 1,350 lbs. per plane.

This system will materially speed baggage handling, Medland said. The only place where slightly more time will be needed is in the unloading of the containers at the terminal.

Time studies have shown that such unloading, which entails lifting the bags up and over the container side, is somewhat slower than emptying a conventional baggage cart. Offsetting this is the fact that there is practically no exposure to damage in loading and unloading containers. Other carriers are also reported to be considering the container system.

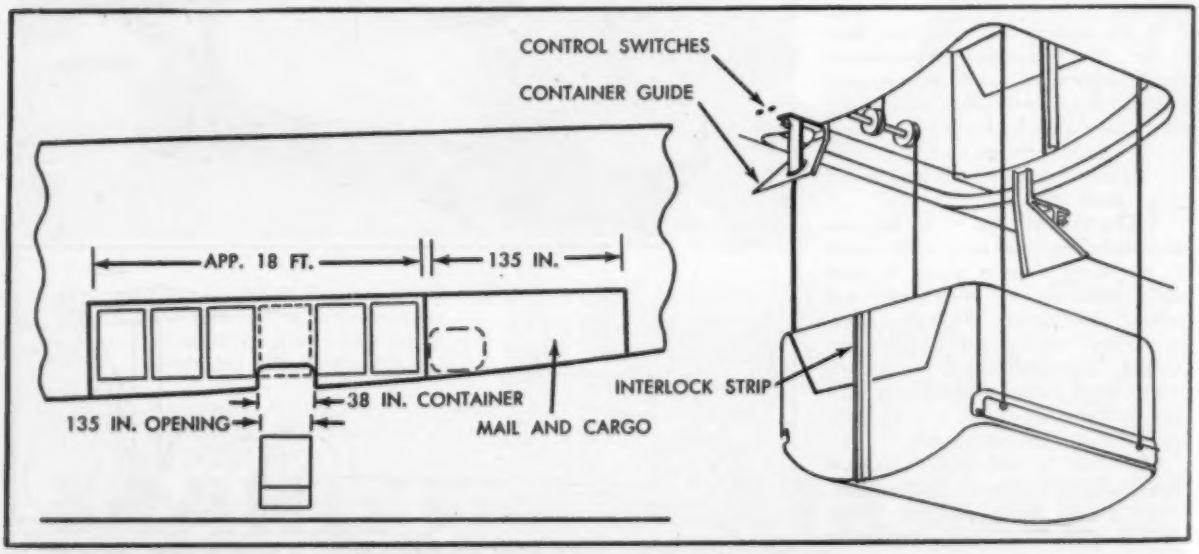
• **Also looking ahead** to jet operations, UAL is studying passenger loading stands. Although it realizes that at major terminals some method other than loading stands may be used, it nevertheless believes that some stations will need them. And, because of larger size (capable of raising to 160 inches and lowering to 110), UAL says these stands can't be pushed by ramp agents.

Therefore, it has had a *powered* stand built by Service Metal Fabricators Co., Santa Monica, and has been experimenting with it for six months. The unit is operated by a 24-volt one-horsepower motor with a power supply of four 6-volt batteries and trickle charger. It is built to the present 130-inch required height, but UAL states that the same principles can be used for a larger stand.

As pointed out, some carriers now think it feasible to taxi jets to and from gate positions. However, airline officials at the meeting emphasized that equipment manufacturers should be urged to develop devices for moving the big planes on the ground.

It seems certain that if a manufacturer should develop an acceptable device—and prove to the airlines that its use constitutes a more economical and better way of doing business—some minds could be changed.

At least four equipment makers have concepts for ground movement of jets: (*Continued on page* 64)



How United Air Lines will use pre-loaded containers for baggage on its DC-8s is shown in above drawings. On left is side view of rear cargo compartment, which takes six containers (five in front compartment). Drawing on right shows how container is raised and lowered.

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• **Consolidated Diesel Electric Corp.:** The Stamford, Conn., company believes that in order to avoid blast and noise inconvenience at major terminals, it may be necessary to cut jet engines at the edge of congested ramp areas. From the ramp's edge, Con Diesel proposes to move the plane to the gate with a pair of "wheel movers."

The wheel mover is a device that is attached to the inside or outside main gear. It is used in pairs, one to each main gear. Weight is about 100 lbs. each. The device consists of two hydraulic motors connected through a suitable gear train to a ring that applies moving power through the rim of the aircraft wheel.

Wheel movers are used in conjunction with, and receive power from, a mobile power unit which also contains facilities for complete power servicing of jets while they are loading and unloading.

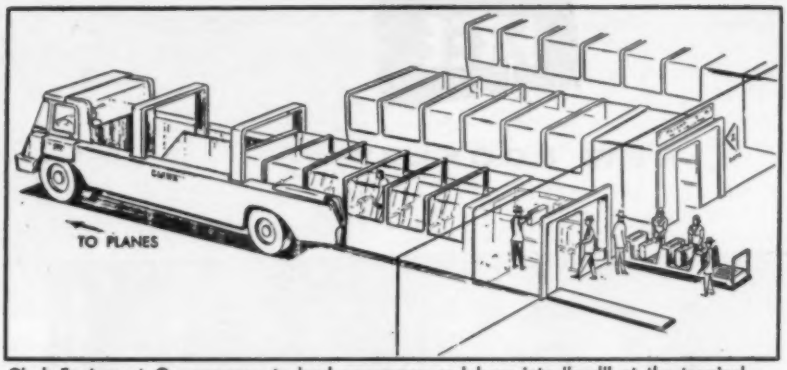
In operation, incoming flights would be met at ramp's edge by the mobile power-wheel mover vehicle. Wheel movers would be attached and control power made available to the cockpit. Next, the mobile power unit would lift itself by hydraulic hookup device to the belly of the plane. Using the movers and the power unit, the pilot could taxi at speeds up to 5 mph.

At the ramp, the unit would supply required 400-cycle ac power. On departure, the pilot would use wheel movers to the edge of the ramp, where he would start the engines.

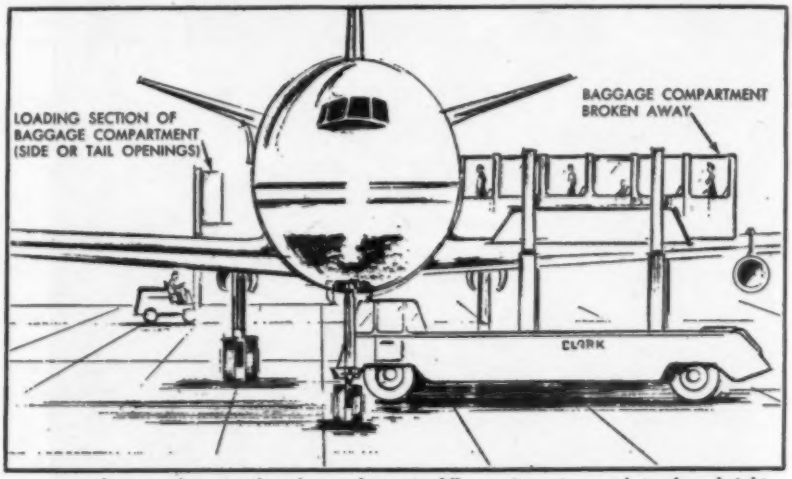
• **Clark Equipment Co.:** Several proposals for handling passengers and for moving aircraft have been presented to the airlines by Clark. One passenger-handling plan entails use of passenger "pods" (see illustrations). Several 60-passenger pods, for example, could be positioned against the terminal building, and would essentially be extensions of the terminal.

Passengers would check in at a pod's entrance, and place bags in a container that goes with the pod. After all passengers were aboard the pod, it would be moved by a straddle carrier to the plane, some distance from the terminal. Baggage containers would be detached and loaded in the plane by other equipment. The straddle carrier would then raise the pod to the height of the cabin door for passenger loading.

Clark says this method keeps passengers and their bags together, keeps passengers out of bad weather, and makes possible more gate positions at a terminal. The pod idea could also be used to carry passengers directly from a downtown check-in point to the plane (straddle carriers can travel 50 mph to 60 mph).



Clark Equipment Co. proposes to load passengers and bags into "pod" at the terminal . . .



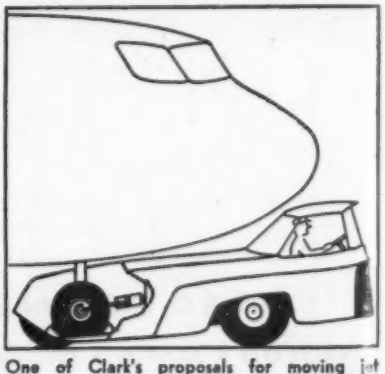
. . . and move them to the plane, where straddle carrier raises pod to door height.

Among Clark's several proposals for moving planes is a special tractor (see illustration) equipped with ramp and hydraulic cylinder that will either pull the plane nose wheel up the ramp or the ramp under the nose wheel. The company urges that the airlines "make a decision, and soon, regarding the type of towing equipment desired and maximum speed at which it must pull a fully-loaded plane."

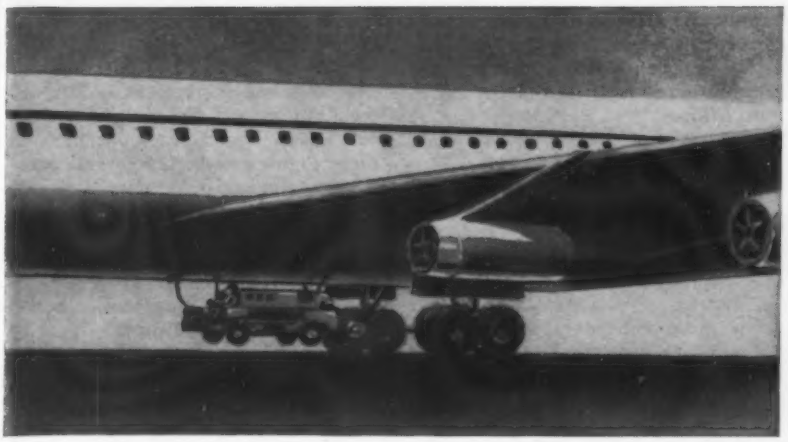
• **Air Logistics Corp.:** This company cites four reasons for towing jets: (1) if average flight were three hours, and 15 minutes was used for moving the plane on the ground, 8% of engine life would be attributed to ground operation; (2) foreign object damage—50% of military jet engines overhauled experience such damage; (3) high fuel consumption—fuel consumed for the minimum taxi operation would be about 230 gals.; (4) effect of noise, blast and temperature on personnel.

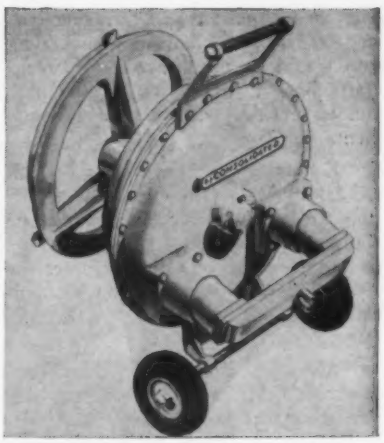
To move big planes, towing vehicles exceeding 37,000 lbs. gross weight would be needed, the company states. Therefore, in its Model 10,000 Aircraft Ground Power and Moving Vehicle, it proposes to use airplane weight for traction through the friction drive principle. The vehicle contains air for starting and electrical power for operating aircraft systems accessories up to 60 KVA.

In operation, the vehicle's driver would engage the plane's mail wheel from the rear with the connecting means (the propulsion lockup device, mounted on the differential, consists of a hydraulic cylinder, electrical plug and two mechanical locks attached to a beam). Power end of the unit is raised into engaging position, rear wheels off the



One of Clark's proposals for moving jet planes is a special tractor, equipped with ramp and hydraulic cylinder, that either pulls nose wheel up the ramp or the ramp under nose wheel. Tractor drive wheels are shown straddling the nose wheel.





Drawing on left shows Consolidated Diesel's combination of wheel movers and mobile power unit in operation. Wheel movers are attached to main wheels, power unit lifts itself to suspended position under plane by a contained hydraulic mechanism. Pilot controls the plane's movements. Drawing on right shows wheel mover.

ground. Hydraulic cylinder provides necessary force for creating a load between the tires of the vehicle and the airplane tires.

The electrical plug connects to the plane at the same time the driving wheels are engaged. Air conditioning connection can be made at the same time. When the crew is ready to move the plane, the vehicle's driver receives a signal and supplies power to the driving mechanism. Movement of the plane is under control of the crew. Speeds of 25 mph are possible with one unit.

When the pilot receives taxi clearance, he requests through the intercom system that air be directed to the aircraft for engine starting. After one engine is started, the vehicle is disconnected.

• **Allis Chalmers** has presented several plans for towing with conventional tractors. It has also urged that airlines make their requirements known, pointing out that equipment cannot be engineered overnight.

On another equipment front, it was revealed that Shell Oil Co. will build an experimental jet refueling truck and loan it to aircraft manufacturers and airlines for test and study. Refueler's capacity will be at least 5,000 gals. and possibly 6,000 to 6,500. ◈◈◈

Subsidy Needs of Airlines Down For Next Two Years, CAB Says

Subsidy needs of the U.S. airline industry continue at a generally depressed pace although the current fiscal year requirements are higher than the average for recent years. This is the picture portrayed in the Civil Aeronautics Board's annual subsidy separation report for 1956.

For fiscal year 1957, CAB estimates the industry will need $48,175,000, of which $27,087,000 is earmarked for the local service airline industry. Total compares with $44.5 million needed a year ago by all subsidized carriers and with $44.4 million estimated for fiscal 1958. It reflects a sharp drop from the $64 million needed in fiscal 1954, the year subsidy needs started down.

• **Significantly, CAB's report** was prepared as of September 1, 1956 and does not take into account a subsequent action which, temporarily at least, removed all subsidy payments to Pan American World Airways. If PAA subsidy is deducted, CAB totals would be reduced between $7 million and $9 million annually.

For the current fiscal year, the entire domestic trunk industry is again free of subsidy with the exception of Northeast Airlines and the local service routes inherited by Continental Air Lines in its merger with Pioneer Airlines. CAB expects NEA, presumably on the strength of its new New York-Florida route, to be free of subsidy in fiscal 1958.

• **Local service carriers,** meanwhile, jumped in their needs from $24.9 million in fiscal 1956 to $27,087,000 this year and $26,871,000 in fiscal 1958. CAB explains the increase as necessary for new route services authorized for local lines in recent months.

The three certificated helicopter lines' needs are rising gradually from $2,784,000 in fiscal 1956 to $3,817,000 this year, and $4,067,000. Those lines also attributed the increase to new services, particularly new passenger operations.

Next to local lines, subsidy requirements of the Alaskan carriers rank highest at $7,527,000 for fiscal 1957, followed by Latin American operations at $7,045,000.

• **Meanwhile, sharp gains** in airmail volume has, despite reduced unit rates, produced increased service payments to the industry. Total service pay last year was $61,305,000. It will rise to $64,549,000 in the current fiscal year and to $68,529,000 in fiscal 1958.

Volume, on the other hand, will go up from 145.2 million mail ton-miles in 1956 to 153.2 million this year, and 162.8 million in fiscal 1958.

The new CAB report also is the first dealing with new airmail authorizations of the cargo lines—Slick, Flying Tigers and Riddle. CAB figures those lines will carry 874,000 ton-miles of mail this year and 897,000 in fiscal 1958. Service pay will be $173,000 this year and $180,000 next year.

The total of service pay and subsidy to the industry this year will be $112,724,000 or substantially under the total of $119,072,000 for 1954.

Continental Plans L. A.-Chicago Service

Continental Air Lines' program for its new Chicago-Los Angeles route calls for inauguration of service on April 28, at which time it will have taken delivery of three Douglas DC-7Bs. The first one is scheduled for delivery in February, which will give CAL a period of more than two months for equipment familiarization.

CAL presently contemplates starting the new service with two round

trips, one a nonstop and the other one-stop at Denver. An additional nonstop would be possible with three aircraft, but it would push utilization and leave CAL without reserve equipment.

Following delivery of a fourth DC-7B in May, CAL will add a one-stop Chicago-Los Angeles schedule via Kansas City. A year later, with the establishment of summer schedules for 1958, CAL will put turboprop Viscount equipment on the Chicago-Los Angeles route.

Although plans have not been finalized, CAL probably will take over Pan American World Airways' present ticket counter space at Los Angeles International Airport while PAA will build an addition to the passenger terminal building to provide space for expanded counter facilities. CAL will be assigned gate positions on the finger presently occupied exclusively by American Airlines.

P. O. Official Suggests Night Mail-Cargo Trips

Airlines may find that the answer to increased jet utilization is to operate night trips carrying only mail and cargo, according to Assistant Postmaster General George Siedle.

"With schedules for transcontinental flights approximating five hours, and from one to three hours for less distant points, this could readily lead to more passengers choosing to travel in the daytime," he said in a St. Paul speech.

"With the price of a jet plane running into the millions of dollars, immobilization will be costly. Obviously one answer would be to operate more night flights carrying cargo and mail."

He also said that "surface and air transportation agencies could profit by commingling bulk mail (parcel post), express and small-sized freight shipments, and by effecting therefor a coordinated through door-to-door service at a single through charge."

This, Siedle declared, would "apply a modern concept of transportation service to the needs of the small business firms who today pay out of all proportion for mediocre service. It would do the same for the large business houses and the individual citizen."

Summary of U.S. Airline Traffic for August, 1956 & 1955

Compiled by American Aviation Publications from Official C.A.B. Data.

Airlines	Revenue Passengers			Revenue Passenger Miles (In Thousands)			Total Ton-Miles Rev. Traffic			% Available Ton-Miles Used	
	1956	1955	% Change	1956	1955	% Change	1956	1955	% Change	1956	1955
DOMESTIC											
American	696,138	629,571	10.6	457,696	389,995	17.4	53,813,411	45,837,590	17.4	60.89	60.07
Braniff	147,947	134,889	9.7	60,981	50,597	20.5	6,574,884	5,441,693	20.8	54.07	53.40
Capital	284,967	238,652	19.4	97,273	74,401	30.7	10,136,871	7,994,368	26.8	44.87	44.42
Caribair	16,816	11,898	41.3	1,148	923	24.3	112,498	86,425	29.6	62.13	55.29
Continental	63,956	n.a.	n.a.	24,257	21,021	15.4	2,537,395	2,213,366	14.6	48.71	45.28
Delta	199,659	170,074	17.4	94,742	76,302	24.2	10,311,823	8,380,219	23.0	53.67	56.35
Eastern	635,811	517,254	22.9	311,581	254,590	22.4	34,351,410	28,199,170	21.8	46.48	46.90
Hawaiian	53,503	50,906	5.1	7,408	7,139	3.8	758,794	797,889	—4.9	59.51	60.13
National	83,001	86,237	—3.7	54,363	57,390	—5.3	6,064,582	6,387,663	—5.1	59.37	59.86
Northeast	83,513	78,867	5.9	16,553	15,750	6.3	1,568,962	1,490,768	5.2	60.02	62.22
Northwest	126,854	125,435	1.1	90,923	89,727	1.3	10,243,003	10,010,847	2.3	57.96	62.98
Trans-Pac.	29,445	23,707	24.2	3,727	3,073	21.3	296,112	239,082	23.9	57.09	58.23
TWA	377,427	344,822	9.5	322,830	278,489	15.9	34,791,215	30,612,480	13.7	64.49	62.71
United	589,469	542,704	8.6	423,475	382,909	10.6	49,049,318	43,978,494	11.5	62.65	63.71
Western	108,555	105,564	2.8	55,977	52,000	7.6	5,844,055	5,454,625	7.1	57.49	58.08
TOTALS	3,497,061	3,101,563	12.8	2,022,934	1,764,402	14.6	226,454,333	198,119,985	14.3	57.14	57.51
INTERNATIONAL											
American	13,131	12,097	1.7	9,621	8,907	8.1	1,229,203	1,139,780	7.8	63.86	76.23
Braniff	2,991	3,251	—8.0	6,224	6,858	—9.3	781,803	861,136	—9.2	56.33	46.05
Delta	5,495	5,032	9.2	6,359	5,759	10.4	688,462	647,767	6.3	53.99	46.45
Eastern	26,641	14,490	83.9	35,679	19,645	81.6	3,953,714	2,192,244	80.4	58.56	68.56
National	6,496	9,953	—34.7	3,067	4,717	—35.0	341,557	541,063	—36.8	45.29	49.25
Northwest	12,272	10,227	20.0	26,842	20,381	31.7	4,605,902	3,538,229	30.2	76.58	68.31
Hawaii	1,183	.....	....	2,988	.....	....	341,353	.....	....	63.92	....
Panagra	12,487	11,858	5.3	14,747	14,044	5.0	1,937,727	1,713,138	13.1	59.26	53.40
Pan American											
Latin Am.	119,660	100,671	18.9	112,982	94,313	19.8	13,863,992	11,736,609	18.1	63.58	64.21
Atlantic	112,786	92,487	21.9	146,944	121,717	20.7	18,166,476	14,904,760	21.9	62.52	64.56
Pacific	31,385	22,910	37.0	91,389	69,020	32.4	11,738,638	9,125,405	28.6	75.55	73.20
(Seattle-Portland-Honolulu)	1,696	.....	....	4,564	.....	....	479,562	.....	....	63.34	....
Alaska	9,486	9,567	—00.8	10,429	11,326	—7.9	1,531,532	1,575,355	—2.8	62.26	60.17
TWA	30,470	27,449	11.0	80,326	71,299	12.7	9,876,037	8,802,177	12.2	70.08	71.98
United	12,065	10,944	10.2	29,985	27,182	10.3	3,211,918	2,923,289	9.9	77.34	79.87
TOTALS	395,365	330,936	19.5	574,594	475,168	20.9	71,926,961	59,946,250	20.0	60.54	66.49
LOCAL SERVICE											
Allegheny	40,597	37,658	7.8	6,701	6,025	11.2	676,329	600,637	12.6	44.08	46.68
Bonanza	11,451	10,520	8.8	2,530	2,203	14.8	255,724	221,223	15.6	42.98	41.73
Central	8,897	8,069	10.3	1,734	1,180	46.9	178,986	123,073	45.4	30.74	23.58
Frontier	18,581	18,091	2.8	4,871	4,720	3.2	554,327	533,473	3.9	57.90	61.90
Lake Central	13,319	12,330	8.0	1,999	1,799	11.1	197,234	178,719	10.4	33.80	32.62
Mohawk	33,942	26,147	29.8	5,850	4,635	26.2	585,327	460,955	27.0	55.20	53.28
N. Central	56,677	48,180	17.6	9,163	7,727	18.6	932,063	788,094	18.3	49.85	50.96
Ozark	30,305	23,162	30.8	4,678	3,438	36.1	480,192	345,016	39.2	39.54	35.54
Piedmont	40,739	33,147	22.9	7,793	6,430	21.2	788,906	654,925	20.5	57.55	53.50
Southern	17,719	15,184	16.7	3,094	2,498	23.8	321,675	259,810	23.8	43.70	38.31
Southwest	30,291	27,814	8.9	6,136	5,457	12.4	605,638	541,212	11.9	52.44	60.74
T-Texas	20,589	13,453	53.0	4,662	3,020	54.4	490,532	321,019	52.8	36.87	35.20
West Coast	22,600	21,584	4.7	3,911	3,807	2.7	365,099	357,026	2.3	50.30	51.53
TOTALS	345,707	295,341	17.1	63,122	52,939	19.2	6,432,032	5,385,182	19.4	47.16	46.71
HELICOPTER SERVICE											
HAS	.....	.....	....	.....	.....	....	2,814	2,682	4.9	43.51	42.00
Los Angeles	2,355	637	269.7	.....	20	330.0	13,175	8,377	57.3	49.65	41.63
N. Y. Airways	4,300	2,680	60.4	81	53	52.8	10,503	7,455	40.9	64.38	56.67
TOTALS	6,655	3,317	100.6	167	73	128.8	26,492	16,514	60.4	53.72	....

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AF Jet Experience Should Help Airlines

TINKER AFB, OKLA.—U.S. airlines planning turbine transport operations may still have many a knotty problem to be solved, but a shortage of information on Air Force jet engine experience can no longer be classed as one of them.

In a three-day symposium here, USAF's Air Materiel Command turned loose its first team of jet specialists armed with every conceivable piece of information the airlines might need in their field maintenance and overhaul programs.

On the receiving end were some 60 engineers and powerplant specialists representing 11 carriers now on the waiting list for Boeing 707s, Douglas DC-8s, Convair 880s or Lockheed Electras. Single target of their attention, however, was the jet engines that will power these aircraft—Pratt & Whitney's J57 and J75, General Electric's J79, and Allison's T56 turboprop.

And what they learned about jets—some encouraging and some discouraging—was, to say the least, impressive.

Removals Example

Take, for example, USAF's Boeing B-52 operation with eight P&W J57s—the nearest thing the Air Force has to parallel future commercial operation of the engine. In the first 16 months since introduction of the B-52 at Castle AFB in June 1955, USAF has removed about 95 J57s prematurely in 81,112 engine flying hours with 40 aircraft.

• **Top cause for removal** was compressor damage due to foreign objects, accounting for about 20%. But this, AMC officials say, is a marked improvement over the 40% averaged by all other engine types, a factor they attribute to the sturdy J57 design.

What do overhaul costs run? Since Tinker took on J57 overhaul in November 1953 some 362 engines processed through its shops have averaged $15,000 for materials alone, some ranging as low as $12,000—others as high as $18,000.

• **It takes a labor force** of about 132 to man a 12-station J57 overhaul shop producing 50 engines per month. Each engine requires 861 manhours not counting an additional 162 manhours for accessories.

Right now Tinker spends 1,075 manhours for each J57 overhaul, but 800 hours has been set as its goal.

J57 overhaul period for the first year of B-52 operation was 500 hours. This was raised in June to 600 and again in October to 800. To date only one engine has been removed for time and AMC technicians see no reason why the B-52/J57 combination will not achieve the same 1,500-hr.-plus figures now in effect for the B-47/J47 operation.

• **Air Force estimates** it would cost about $4,270,000 to build and equip an engine shop capable of handling 50 per month output. Of this, $1,307,000 would go into shop tools and equipment; $620,000 for accessory overhaul and test facilities; $300,000 each for a three-unit test cell and for general shop testing tools and equipment.

Prospective operators of the GE J79 and Allison T56 engine were not so fortunate, however, in the amount of Air Force operating experience so far compiled on these engines.

Tinker, for example has overhauled only three J79s at an average cost of $71,000 each and AMC currently figures the engine will require 2,400 manhours for overhaul. A shop producing 50 engines per month would require an estimated 150,000 sq. ft. area using vertical overhaul techniques.

• **For field maintenance,** the relatively light sheet metal construction of the J79 necessitates handling in the horizontal position. About 150 sq. ft. is required per engine to be maintained; it takes 40 manhours to conduct a combustion chamber check each 50 hours of operations, and 80 manhours to change a main fuel control unit.

First J79 Details

First official hint as to the general characteristics of the J79 came during the session. AMC technicians described its compressor as a 17-stage, single-spool arrangement with variable-controlled stator blades in the first seven stages.

J79's turbine-compressor combination is supported by three main bearings with the three-stage turbine mounted on a short-chord shaft. The G-E engine has 10 combustion "cans" and an annular transition section. Afterburner design employs a converging-diverging type nozzle.

One particular facet of the J79, the use of metal bellows in external fluid lines, brought strong words of caution from AMC. J79 engine specialist warned carriers not to live with these bellows in cooling, anti-icing and oil lines of their jets.

Cracking and failure of these expansion bellows has been a sore spot for the Air Force in the J35, J47 and J73 jets, he added, and now there are nine of them in the J79 that are "failing as fast as the clock is turning its hands."

• **First tangible flow** of operating experience on the Allison T56 turboprop is not due to start until sometime next month when the first Lockheed C-130 squadron is activated at Armdore, Okla.

From limited experience to date, however, AMC estimates it will take three men three hours to change the complete power package. T56's torquemeter also can be changed in about nine manhours, and the reduction gear assembly about six manhours using three men.

So far, the Air Force has increased T56 overhaul period from an initial 50-hour interval to 300 hrs. and reduction gear time from 50 to 400 hrs.

As to overhaul, USAF to date has no facility in operation but plans to do this work at San Antonio Air Materiel Area starting early next year. Overhaul of 17 engines and 42 reduction gear units by Allison under USAF contract have averaged $8,585 per engine and $2,285 per reduction gear assembly.

Broad Jet Experience

Extensive jet overhaul experience at Tinker, backed by some 42,828 engines handled since August 1947, has developed some valuable statistics on jet testing.

For example, the J57 running time in the test cell after overhaul averages about three hours but the engine spends anywhere from 7.5 to 9.5 hrs. elapsed time from installation to removal. GE's J79 averages two to three hrs. running and four to five hours door-to-door, and the T56 two to 2.5 hrs. running and seven hours elapsed cell time.

During a recent period at Tinker, 38 J57 engines were tested for an overall cell time of 301 hrs. or an average of 7 hrs. 56 mins. per engine. AMC estimates the J57 burns an average 1,600 gals. of fuel during testing, with some variation upward in summer and downward in winter. ◈◈◈

Jet Symposium Coverage

This is the first in a series of on-the-spot reports by AMERICAN AVIATION *of the joint USAF-Air Transport Assn. jet engine symposium held at Tinker AFB Oct. 22-24. Subsequent articles will cover detailed field and shop requirements for overhaul, jet accessory performance, experience with compressor damage, etc. as disclosed by AF experts.*

Airline Commentary

By Eric Bramley

Best crack about the airlines' system of handling baggage was made by Marv Whitlock, American Airlines' v.p.-operational planning, at an ATA meeting in Miami Beach. The ATA subcommittees were studying ground-handling problems that will be encountered with jet transports. Whitlock told them that faster ways must be found to get baggage on and off the jets. And he added: "We're celebrating the 99th anniversary of our baggage handling system. It was 99 years ago that the first transcontinental stagecoach operated. And they were using the same baggage handling system that we're using today. As a matter of fact, the baggage allowance was exactly the same!"

• • •

Recently we commented that most awards in airline suggestion contests seem to go to overhaul and maintenance people. We asked whether anyone in traffic and sales ever came up with a good idea. A well-known airline official writes to say that sales personnel have lots of good ideas, but how can you evaluate them? "Let's assume that I had the basic idea for the Airlines Ticketing System and could establish my claim to it," he says. "How much is it worth to my airline? . . . The suggestion was made that two additional seats be placed in our DC-6s. This has since been done. What is the value of this suggestion in terms of potential revenue, or should it be in terms of actual revenue realized in the first year? Does having two extra seats really mean that you will carry two more passengers? . . . Most maintenance suggestions are of a nice concrete type where you can actually see the value of the suggestion or compute it on the basis of known facts. Most traffic and sales ideas you can't measure in advance and very frequently can't measure after they have been placed in effect . . ." A very valid explanation, and a sticky problem. But we'd like to see someone try to devise a method to recognize sales people who make constructive, money-saving or revenue-producing suggestions.

• • •

Odds and ends: Watch the waste on "little" items, Eastern Air Lines warns its employes. It points out that 8.5 million paper napkins cost almost $40,000 a year, 65,900 jars of powdered coffee run $30,000, while 10.6 million hot drink cups cost $127,000 . . . Pan American thinks it has made the biggest "pay later" sale. Several weeks ago it hauled two 20-man baseball teams from Colombia and The Netherlands to Milwaukee. Cost was $16,500 . . .

Sales, Traffic, Promotion

United Air Lines has adopted the phrase "Red Carpet" to identify its top flights. Specific trip names have been dropped, with the exception of the transcontinental "Hollywood" and the Chicago-New York and San Francisco-Los Angeles "Executives." Homer Merchant, UAL's general sales manager, notes that it's the first time the company has had "an overall name for our finest and most competitive service." Special Red Carpet ticket envelopes, in-flight stationary and baggage tags will be used . . . UAL has released "Holiday in Hawaii," a 30-minute film produced for it by Cate & McGlone, Hollywood. Film is available for free showing to clubs, schools, etc . . .

Delta Air Lines has started a midnight-to-dawn radio show on WDSU, New Orleans. Features music, news, sports, weather and personal appearances of guests . . . When you make your reservation on Delta Golden Crown flights, you're asked how you want your in-flight steak done. The company now reports the following statistics: 86% of passengers want them medium, 9% rare, and 5% well done . . .

Two more airlines are promoting theater trips to New York. **American Airlines** is offering "Hit Shows of New York," a weekend package deal. And **Swissair** is featuring "Manhattan Showcase," a package available to its passengers traveling to or from Europe. Both airlines are offering tickets to "My Fair Lady," the top Broadway show . . .

National Airlines has completed installation of Burroughs Ticketeer ticketing machines in Miami, New York and Washington offices . . . Northwest Airlines has shipped its 1957 calendars to sales managers and customer service managers for distribution. Total of 75,000 was printed . . . **VARIG Airlines**, of Brazil, opened a west coast sales office at 240 Stockton St., San Francisco . . .

TWA is improving its timetable. Quick reference boxes are being used. The gray background tone has been eliminated from sky tourist flight columns, and is used only on flight headings. Also interesting is the fact that the "Condensed Domestic Schedules" heading has been changed to read: "Express Flights in the U.S.A." Explains Henry Riegner, advertising director, "We probably have been guilty of using industry jargon which has little meaning for the man on the street" . . . To assist faculty members of educational institutions planning a sabbatical leave, TWA's air world education department is distributing a brochure, "Your Sabbatical Year Abroad" . . . Packets of coins from several European countries are being distributed by TWA to plug 14-day excursion fare . . .

Pan American World Airways has printed "Around the World by Clipper," a booklet based on a survey of around-the-world passengers who tell how they got the most out of their trips. Another PAA book is "Ski New Horizons" . . .

Delta Air Lines signed an agreement with Pennsylvania Railroad under which PRR will accept Delta tickets for Philadelphia-New York transportation when New York airports are closed. When passengers deplane at Philadelphia, they will be issued coupons for taxi fare to the station and a ticket on PRR to New York. The railroad agreed to accept Delta "ticketeer" tickets—both companies use the same type ticketing machine. Arrangement speeds movement of passengers by eliminating check-in procedures at the airport ticket counter and at the rail terminal . . .

To cut ground time of in-transit aircraft, Air France is using a "transit truck" at New York International Airport. Idea is to "bring the maintenance hangar to the aircraft," AF says. The truck, a 1955 Dodge, contains 110-gal. tanks for water and alcohol, two work benches and special tool racks, spare parts and hardware cabinets, technical library, electrical test panel, 24-volt generator and other equipment. Atop the truck is a platform with two ladders, 8 ft. and 14 ft., respectively, used to gain access to wings and empennage.

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Air France 6
Air Logistics Corporation 36
AiResearch Manufacturing Company, Div. of The Garrett Corporation ..48 & 49
Alpha Molykote Corporation, The 55
Bell Aircraft Corporation 25
Bendix Aviation Corporation, Scintilla Division 41
Boeing Airplane Company 9
Braniff International Airways, Inc. 60
Bristol Aeroplane Company, Limited, The 57
Bulletin Board (Classified) 70
C & H Supply Company (Metal-Cal) 47
Capital Airlines, Inc. 8
CONVAIR—A Division of General Dynamics Corp. 1
Curtiss-Wright Corp. 51
Diners' Club, Inc., The 67
Douglas Aircraft Company, Inc. 17
Elastic Stop Nut Corp. 2

EMPLOYMENT SECTION

Bendix Aviation Corporation, Bendix Products Division 73
CONVAIR—A Division of General Dynamics Corp. 72
North American Aviation, Inc., Columbus Div. 71
Esso Standard Oil Company 31
Fairchild Engine & Airplane Corp. 3
Flightex Fabrics, Inc. 44
B. F. Goodrich Company, The 20
Hi-Shear Rivet Tool Company, The 5
Jeppesen & Company 8
Lear, Inc. ..... 42 & 43
Hotel Lexington 52
Lockheed Aircraft Corp. 33
McDonnell Aircraft Corp. 35
Minneapolis-Honeywell Regulator Co., Aeronautical Division 45
Monsanto Chemical Company 54
Northrop Aircraft, Inc. Anaheim Division 58
Pan American World Airways, Inc. ..38 & 39
Phillips Petroleum Company 76
Proto Tools 5
Purolator Products, Inc. 53
Reading Aviation Service, Inc. 16
Ralph C. Robinson Company 8
Servomechanisms, Inc. 75
Shell Oil Company ..... 12 & 13
Sikorsky Aircraft, Div. of United Aircraft Corp. ... 26 & 27
Solar Aircraft Company 29
Stewart-Warner Electronics, a Div. of Stewart-Warner Corp. 63
E. B. Wiggins Oil Tool Company, Inc. .. 19
Winslow Aerofilter Corp., a Div. of Winslow Engineering & Mfg. Co. 46

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How Pygmies Hunt Elephants for Food

Those pygmies in the Belgian Congo are pretty smart little people when it comes to hunting. They'd have to be in order to survive centuries in the dense equatorial forest with all manner of natural enemies.

Nobody really understands the pygmies and what makes them tick. They don't seem to want any help; they just want to be left alone to live in the forest. They maintain no permanent camps, but keep on the move and build temporary camps as required. By a sixth sense they know their way in the jungle.

Their huts are quite low, so low that they can't stand up straight inside. The huts consist of nothing except a framework of branches covered heavily with foliage. Inside there's a fire and a bed or two consisting only of branches built up a few inches from the dirt floor. Cooking utensils are extremely primitive.

The only modern acquisition is metal for the tips of their spears and arrows, and knives of various kinds. Clothing is meager and minimum.

Pity the Pachyderms

Elephants are great delicacies for pygmies and thousands are killed for food every year. (There are an estimated 400,000 in the Congo and 25,000 killed every year.) You wouldn't believe that these dwarfs could master elephants, but they have two ingenious methods of killing the big beasts.

One method is as follows. A tribe of pygmies will track down a herd and pick out a particularly good one for the kill. Then one pygmy will cover his body with elephant dung to cover up pygmy body odor, sneak into the center of the herd and under the elephant marked for the kill, and stick a lance deep into the elephant's belly. Then the pygmy scoots away fast.

From then on the pygmies just follow the fatally injured elephant until he dies. This may take days and may cover a lot of mileage, but the pygmies have nothing to do anyway. When the beast finally dies, the pygmies gather around for a terrific feast and they gorge themselves to the fullest, the feasting often taking days. Having been well fed, the pygmies are happy for some time to come.

The other method of killing involves the locating of an elephant herd, then cutting a path through the jungle and somehow maneuvering the elephants into running through the path. On each side of the path are pygmies with knives who cut the tendons of one elephant's feet as he passes by. As in the other method, the pygmies merely follow the fatally-injured elephant until he dies some days and miles away.

The Congo government has its problems with pygmies, but does its best to keep them happy and to offer education and work when either will be accepted, which is rare. But pygmies get into deathly feuds from time to time and murders are committed. Then comes the problem of punishment, because a pygmy will die if he's imprisoned for several months. Being a creature of the forest he can't stand being hemmed in. So the government merely transfers the guilty party to a distant point and turns him loose. Not a bad solution.

The hotels in the isolated sections of the Congo are all very interesting and adequate as tourist stops, but a tip to the traveler is to be sure to take his own soap and toilet paper (both apparently are stolen from rooms) and a flashlight and a candle. Usually there's hot water late in the afternoons, and electricity until about 10 o'clock, but from then on a flashlight comes in handy. And if you want to do any visiting in your cabin, a candle is a necessity.

Every hotel, no matter how small, has a bar. There is scotch whiskey available everywhere but no bourbon whatsoever. There is gin, but it's beyond the capability or imagination of any hotel keeper to mix up a dry martini even though the ingredients are available. There is the usual collection of ultra-sweet (and unpalatable) French and Belgian aperitifs. Beer is almost always available. Coca Cola is frequently found, and on occasions there is quinine water for a gin and tonic. Ice is not very plentiful.

Nights Cool

Quite in contrast to what I had expected, the nights were cool everywhere except in the lower reaches of the Congo such as at Leopoldville, where air-conditioning is welcome. In the back country where our Sabena tour did most of its traveling, we were at altitudes of 1,000 to 4,000 feet. No matter how warm the days might be, the nights were delightful and even a blanket was desirable.

Since many of the hotels are considerable distances from radio-telegraph stations or post offices, they have a good system for getting hotel reservations and special messages. Every afternoon at 2 o'clock the government radio gives out hotel reservations and messages to all of the isolated hotels. The hotel keepers seemed to turn on the radio only on such occasions, as nobody seemed to be the slightest bit interested in news of the world.

Even pygmy women have a certain amount of modesty, as this photo plainly reveals.

WWP seems happy with his Belgian Congo "harem" even though its members are a bit undersized.